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PREFACE

THIS is a book of beginnings. The idea embodied in it is the product of my own experience in attempting to teach various courses in divers branches of social science—economics, anthropology, and sociology. In time the realization grew upon me that no matter what the specific subject, there were certain fundamental facts about man, society, and the world, and the relations of each to the others, that I felt it necessary to establish before I could deal scientifically with more detailed matters. So whether the course was labeled Immigration, or Population, or Unemployment, or Standard of Living, I found myself inclined to begin them all alike for the first two or three weeks. The undesirable features of such a procedure are too obvious to call for specification. Presuming that others beside myself might have had a similar experience, I resolved to put some of the essentials in easily accessible form.

The purpose of this book, then, is to lay the groundwork for the pursuit of study in any or all of the departments of social science. In itself, I hope the book will enable the reader to gain a clearer insight into the nature of social relations, and the possibilities and limitations of social effort. But more than this, I hope it will relieve the teacher and the student of the neces-

sity of consuming an undue amount of time in getting started on the pathway of scientific consideration.

There are, particularly in the latter part of the volume, numerous positive, possibly dogmatic, statements for which no adequate evidence is provided. These are largely matters of opinion, belief, or interpretation. If these constitute a challenge to the acceptance of the student, inciting him to demand evidence and, if possible, proof, then the book will be fulfilling its mission. For it is not intended to be a repository of unassailable sociological facts, but a stimulus and aid to the study of social relationships.

I wish to express my heartfelt appreciation and gratitude to my friends Harvey Zorbaugh, who has read the entire manuscript, and Lorande L. Woodruff, who has read a vital part of it. Both have made pertinent suggestions which I am sure have added to the value of the book. It goes without saying that the responsibility for all errors and crudities rests with myself.

H. P. F.

New York, March, 1927.

CONTENTS

THE FOUNDATIONS OF SOCIAL LIFE

CHAPTER I

THE EARTH-LIFE BOND

HUMAN societies spin out their existence on the surface of a relatively minute and insignificant planet known as The Earth. This planet is 24,902 miles in circumference, and has a total area of about 197,000,000 square miles, of which about 145,000,000 square miles are water, and 52,000,000, or only a little more than one-fourth, are land. The outermost layer of the earth consists of a gaseous envelope, called the atmosphere, which is over 100 miles thick. Most human activities are carried on at the boundary where the atmosphere meets the land and the water. The portions of the earth with which human societies come in contact are composed, according to latest knowledge, of about 90 known elements, and two or three more that are partly known or assumed, each of which exists in an absolutely fixed quantity, and each of which, so far as we know, has certain constant and positive qualities which make it what it is. These chemical elements may mix or unite in a vast number of combinations,

providing all the multitudinous forms of matter, but neither through natural causes nor through the agency of man has any one of them ever been altered in either quantity or character.[1]

To the crust of the earth, so composed, human societies bear a relationship of such intimacy and dependence that their forms and achievements are absolutely limited by the conditions which the earth sets. An effectual realization of this truth is the starting point of all sound sociology.

The nature of this tie between human societies and the earth depends upon the fact that human societies are composed of human individuals, and human individuals are living organisms. Human societies can do nothing that human individuals do not make possible; human individuals can do nothing that is impossible to organisms living on the surface of the earth. The first stone in the foundations of social life is, accordingly, the essential relation of the living creature to the earth.

Two Basic Life Needs

Living beings require two fundamental things from the earth—standing room and food. Both of these demands are exclusive or monopolistic, that is, whatever in the way of standing room or food is enjoyed by one organism is denied to every other organism for the time being. There is this difference between them, however: standing room is not ordinarily diminished or depreciated by use; food is destroyed, temporarily at least. A horse browsing closely in the pasture monopolizes both space and food while he is in a given spot. But when he moves on, the standing room is still there unimpaired,

at the service of any other horse, whereas the food is gone. Consequently, successive generations of any species may go on living indefinitely in any locality, and there is always as much room for the next generation as there was at the beginning. But this is by no means necessarily true of food. On the other hand, standing room is incapable of any expansion while food seems to offer the possibility of continuous increase.

Standing Room

For creatures that live upon the land there are just 52,000,000 square miles of land of various kinds; for those that live in the water, just 145,000,000 square miles of water of varying depths and degrees of salinity. It is clear, then, that the first way in which the earth asserts its domination over living things is by setting positive bounds to their possible numbers by limiting absolutely the total amount of standing room. This truth may be stated as a broad generalization thus: There can never be more life, of any one kind or of many different kinds, at any given time, than the earth provides standing room for.

This relationship is exhibited most clearly by plants. For in the case of plants, the demands for standing room and for food are so closely intertwined as to be almost indistinguishable if not identical. The plant's standing room is the source of its food supply and its food supply is coterminous with its standing room. For practical purposes, therefore, the life limitations of plants may be discussed in terms of standing room only, with the reservation already noted, that the food supply might conceivably be exhausted. It is almost axio-

matic that not more than a certain number of plants can be made to grow in a given space. This truth is often painfully impressed upon the amateur gardener whose ambitions are quite disproportionate to the size of the plot at his disposal. How resentfully he reads the instructions on the seed packet that tell him to thin out the plants to a foot apart! How valiantly he tries to circumvent Nature by liberality with the fertilizer! In the end he discovers that while it is quite possible to raise a considerably larger number of plants than the directions indicate, they are certain to be feeble and unproductive specimens, and that there is a limit to the number of even these attenuated starvelings that can be kept alive in his little patch.

What is true of the back-yard garden is true of a continent, true of the world. The earth can support only a fixed number of plants. What this number will be will depend upon the kind of plants. In actual life, of course, there are innumerable kinds of plants. But the rule holds good just the same. This principle is clearly illustrated on certain islands such as lie along the coast of Maine. These islands, except where they have been altered by man, are covered by a close growth of trees, usually of a small number of species. Even the untrained eye can appreciate readily that there are all the trees on such an island that there can be. There is no room for more trees between those already growing, and they cannot overstep the margins of the island. The earth is an island in space. There is room for only a certain number of plants upon its surface and they cannot reach out beyond its confines.

When we turn from the plants to the animals the significance of standing room becomes less obvious, and in fact less determinative. It is true that among some of the lower animal forms standing room, while not identified with the food supply, is scarcely less positive in its limiting function than among the plants. This is easily realized by considering the barnacles on a rock. But the majority of animals, possessing the power of locomotion, have no fixed standing room, and are not obviously restricted in this particular. The domination which the earth exerts over them, if any, must be exercised primarily through the demand for food. Plants are clearly subject to two controls by the earth; animals *seem* to be subject only to one. It is most important to realize, however, that this difference is only an apparent one. Animals are subject to two controls just as truly as plants. The only reason why it seems otherwise is that in the case of animals the control through food is so drastic that the other scarcely comes into play. That this is true is quickly understood when one reflects that animals occupy space as much as plants, and if there were unlimited food bears, rabbits and ants might be crowding each other as closely as pine trees, huckleberry bushes, and grass.

Food

The rôle of food in the earth's control of living organisms is much less simple than that of standing room, and so requires more extended consideration. Take the plants first. Plants have the faculty of deriving their sustenance directly from the earth. It is this, in fact, which primarily distinguishes them from the animals. In other words,

plants draw from the earth's crust, including the atmosphere, certain of the chemical elements of which it is composed—particularly carbon, nitrogen, phosphorus, hydrogen, oxygen, etc.—and transform them into living tissues. While these elements are in this form they cease to be food for other plants (with the exception of certain parasites) and if at any one time all of the plant building elements were to be drawn up into living organisms the limit of plant increase would then be reached. This is, of course, never the case. The earth is never completely drained of plant food. However, it would eventually be drained, if the food value of these elements were permanently destroyed as soon as they were transformed into living tissue. Vast as are the supplies in the earth's surface, they could not outlast the requisitions of millions of generations of plants. Fortunately, not only are the elements not destroyed—no element is ever destroyed by any means—but their eventual utility as plant food is not even impaired. When they have served their purpose in the body of the plant they are ordinarily returned to the earth in such a way as to become ultimately available as food for later generations of plants. There is thus a rotation of certain elements from the earth into the bodies of plants, back to the earth again, once more into plants, and so on. Were it not for this provision of Nature the earth would have become a barren waste long ago. But the total quantity of plant food at any given time, assuming it to be all utilized, is a fixed amount, and so food joins with space in definitely limiting the volume of plant life that can exist at any time.

And if it transpire that some of these elements are returned to the earth in such manner as to make them unavailable for plant food the possibilities of future plant life are diminished by just so much.

Our generalization may now be extended to state that there can not be any more plant life at any given time than the earth supplies standing room *and food* for.

The food situation of animals is much less simple. Animals do not get their subsistence direct from the earth, but either from plants, or from other animals that get it from plants, or from animals that get it from animals that get it from plants, and so on. In the last analysis all the food of animals comes from plants. Consequently, while animals are not directly subject to earth conditions in the matter of their food but rather to the whole vegetative system, they are none the less dominated by earth qualities, and the ultimate restrictions placed upon their numbers are more, rather than less, rigorous than in the case of plants. There can be no more animals at a given time than there are plants to feed them.

An even more inclusive generalization may therefore be set up: Forms and ratios of living organisms may vary indefinitely, but the total volume of life that the earth can support at a given time is a fixed quantity.

It is one thing, however, to prove that a limit exists, and quite another thing to show that the limit has any significance. A limit is of no practical importance unless there is a desire or tendency to reach that limit. The fact that the air becomes too rare to support hu-

man life above an altitude of 20,000 feet or so is of no significance until men have the mechanical means to raise themselves to that altitude. The fact that the earth can support only a given amount of life is inconsequential unless there is some tendency for this amount of life to be produced. What are the facts in this regard?

Possibilities of Reproduction

The increase of organic life in this world is the outcome of reproduction. The fact of reproduction, and the rate of reproduction, depend upon two factors, the capacity to produce, or fecundity, and the urge to produce, or (broadly speaking) the sexual impulse. Every species must possess both these endowments, adequately developed, or it will speedily become extinct.

Since we are seeking to understand human society, and since man is a bi-sexual animal, we may hereafter confine our discussion of the principles of organic increase mainly to the bi-sexual types. Among these types, the capacity of the species to increase is virtually dependent upon the females. The males are ordinarily able to fertilize as many ova as the females are able to produce. Among some of the lower species of animals this capacity reaches remarkable proportions. Examples of extreme fecundity are familiar to every student of evolution; some of them have become classic. One of the most familiar is that of the oyster, a creature neither the highest nor the lowest in the organic scale. It is said that a very large oyster may lay as many as 60 million eggs in a year. The average American yield is 16 million. Taking this latter figure,

and starting with a single pair of oysters, it appears that if all the offspring survived, half being males and half females, by the fifth generation—the great-great-grandchildren of the original pair—there would be a mass of oyster shells eight times the size of the earth. And this is not a particularly rapid rate of reproduction, as Nature goes. Professor Woodruff, who has, as you might say, domesticated the paramœcium in his laboratory at Yale, has reached the conclusion, after careful computations, that the descendants of a single individual of this species if they all lived, would, at the end of the 5071st generation compose a mass of protoplasm "greatly exceeding 10^{1000} times the volume of the Earth." This would take about eight years.[2] And Havelock Ellis tells us of one minute organism whose rate of multiplication is so great that if none of its offspring were destroyed, in thirty days they would form a mass a million times larger than the sun.[3]

Furthermore, a high rate of multiplication is by no means necessary to produce stupendous results in an incredibly short time. Reproduction is literally multiplication, and so tends to proceed at a geometrical ratio, and every schoolchild knows the possibilities of a geometrical ratio. An annual plant, producing two seeds only, would in 21 years produce 1,048,576 individuals provided each plant fulfilled its life cycle. Or a species of animals, each pair of which produced ten pairs annually, each animal living ten years, would increase from a single pair to over 700,000,000,000,000,000,000 pairs in twenty years. The fulmar petrel lays only one egg a year, yet it was believed by Dar-

win to be one of the most numerous birds in existence.[4]

Forces of Reproduction

The actual fecundity of different species of organisms ranges between very wide extremes. But it is safe to say that every existing species of either plants or animals has the physiological capacity to cover the earth in a very brief period if there were nothing to stop it. But here again, capacity is one thing and performance is another. A capacity is of no practical significance unless there is some tendency to realize that capacity. In the bi-sexual species the ova produced by the females do not become living offspring unless they are fertilized by the spermatozoa produced by the males. In order that this may take place some form of mating is necessary. If there were no impulse leading to mating there would be no fertilization and no offspring. Or if the mating impulse were insufficient to bring about the fertilization of all of the ova the possible production of offspring would be reduced by just so much. That such an impulse exists in all organic species is a matter of common knowledge. For want of a better word we call it "Sex Love" or, rather inaccurately, "the reproductive instinct." This is one of the two basic impulses that exist in all forms of life, that are essential, in fact, for the continued preservation of the life of any species. For our present purposes it is sufficient to observe that the well-nigh universal rule in Nature is that this impulse so operates that, as a matter of fact, the vast majority of the ova produced by females are fertilized, and begin an existence as new members of the species. Ef-

fectual fecundity, therefore, always approximates the maximum capacity of the females.

The general principle toward which we are working may therefore be stated as follows: Every species of organism in Nature regularly produces enough offspring to cover the earth in a very few generations if left unchecked.

The Inescapable Struggle

We observe, then, the earth on the one hand, and the living creatures that depend upon the earth on the other hand, arrayed in an inescapable antagonism to each other. Living creatures of every type are actuated primarily by two powerful and deep-seated impulses, the impulse to seek food, and the impulse to mate. The former of these drives existing individuals to occupy the standing room and deplete the food supply of the earth in the present. The latter drives them to produce myriads of offspring who will be seeking to occupy the standing room and deplete the food supply of the future. Against these universal impulses of organic beings the earth opposes a fixed amount of standing room and a positively limited food supply. The inevitable outcome of such a situation is struggle.

Struggle for Existence

This struggle presents innumerable aspects, but may be considered in two main forms. The first of these is the direct and immediate struggle of the individual organism to occupy the standing room and appropriate the food supplies that the earth has to offer. The earth provides food, but it feeds no one. Some effort is necessary on the part of every creature to get its sustenance. The oak tree

must have the energy to drive its roots down into the soil, through the crevices of granite rocks if need be, to lift tons of water out of the soil up to its leaves and branches, to resist the pull of gravitation in holding itself erect, as well as to provide for chemical reactions of various kinds in turning inert elements into living tissue. The salmon must exert itself to swim through the water, often against the current, the eagle to fly through the air, the fox to dart through the woods. Anyone who has observed the resistless might with which a growing tree will push over a stone wall or split a concrete sidewalk, will realize something of the energy of plants. Anyone who has tried to push a paddle quickly through the water will appreciate the resistance the fish has to overcome. We all know something of the effort required to propel ourselves over the ground, to say nothing of lifting ourselves above it, as the animal or the bird must do.

But this phase of the great life struggle is a relatively simple proposition. Every organism, if it is to survive, must have the necessary equipment and energy to get its food from the earth, whatever else it may have or may lack. If it does not have them it does not survive, and that is all there is to it. If the life struggle consisted merely in getting what we need from inexhaustible supplies with no one else to interfere existence would be relatively easy and peaceful for all of us.

Competition of Life

The second main form of the struggle arises from the fact that no individual organism is alone in its occupancy of standing room and its pursuit of food. Quite contrariwise, he is

surrounded on every side by a host of competitors. As already observed, these basic demands are monopolistic. What he gets, no one else can get, and conversely, what the others get he can not get. This kind of struggle involves the principles of rivalry, competition, conflict. The first form of struggle is with the sources of food themselves; the second form is with other organisms that want the same food. The first form would exist if there was only one organism in the world with a given set of needs; the second arises only from the existence of numerous organisms with similar needs. It will be convenient and a saving of time to have definite names to indicate these two forms of struggle, and for want of better terms we may call the first the "Struggle for Existence" and the second the "Competition of Life." Professor Sumner was perhaps the first to explain this distinction, and an interesting discussion of it may be found in his book, "Folkways," [5] though possibly in this passage it is not made sufficiently clear that not only inanimate things but living organisms are often ranged on the side of Nature in the struggle for existence. For it should be carefully noted that while the competition of life is always between living organisms, the struggle for existence is by no means exclusively between a living organism and inert matter, but may also be between living organisms. It is a question of the nature of the struggle. The struggle for existence is between an organism and its source of food supply. The competition of life is between two or more organisms seeking the same food supply or the same standing room. A hawk pursuing

a rabbit is occupied in the struggle for existence; two English sparrows scuffling over a few grains of oats on the pavement are engaged in the competition of life. This distinction is of primary importance, because it is not out of the struggle for existence *per se* that rivalry and its attendant hostilities arise, but out of the competition of life. Two organisms pursuing their struggle for existence along independent lines—that is, seeking different kinds of standing room or of food—will not develop any antagonism toward each other—unless one organism chances to be the food supply of the other. But the competition of life always engenders antagonism.

The competition of life arises out of similarity of needs. It is therefore likely to be strongest between those organisms whose needs are most nearly identical. This means that it is keenest between the members of the same species. Not that it is confined exclusively to the members of a given species—by no means. In so far as different species are dependent upon the same food supplies there will be rivalry between them. This may involve creatures as widely separated as birds and animals. Thus not only hawks and owls, but foxes and wolves, compete for the supply of field mice and young rabbits. A brood of young quail may serve as a meal for a snake, a weasel, a fox, a mink, a skunk, a cat, a hawk, or an owl, according to which gets there first. The United States Department of Agriculture, ever on the look-out for cases of competition between useful and non-useful organisms, has recently determined that the prairie dog and the beef steer are ri-

vals, both being dependent on prairie grass, and has accordingly decreed the elimination of the former.

But on the whole, the competition of life is most rigorous among the members of the same species, and within a species it is keenest among those who occupy approximately the same territory, and therefore jostle each other most intimately in their food quest. This means that the competition of life reaches its climax of intensity between parents and children. Their demands are virtually identical, and their feeding ground, at least in the beginning, is the same.

Paradox of Parenthood

We are thus brought face to face with one of the strangest, most paradoxical, and yet most inescapable features of life on this planet; from the strictly materialistic point of view, parents and children are natural enemies of each other, and the most dangerous enemies that either has to face.

This truth can be appreciated most easily in the case of the plants. Take, for example, a pine tree. The "children" of this tree appear in the form of seeds, which in order to grow into saplings, must find standing room in the earth, and food supplies from the soil. But this is exactly the kind of standing room and of food that the parent plant is already utilizing. The great majority of seeds will fall within an area already dominated by the old tree. The bulk of them, perhaps, will never germinate at all. A few will sprout and perhaps grow a few inches in height, but will soon perish, deprived of light, air, moisture, and food by the parent. A few, possibly, will be carried by winds or birds to more remote spots; there, if other con-

ditions are favorable, they may be able to secure the monopolistic supplies that will permit them to survive. It appears that the invariable rule for young plants (however it may be in higher spheres of existence) is that the only way to see life is to get away from the old folks. In densely wooded regions, there is no such outlet. A six-year-old naturalist, walking through a New England forest with her father, inquired, "Daddy, where are all the baby trees?" There were, in fact, no baby trees. There never are baby trees in a forest, with here and there a puny exception. They have all been choked to death in infancy by their elders. If, on the other hand, a few young trees manage to survive and grow to maturity they are apt to be the means whereby the final death blow is struck to their decrepit elders. These facts make it easier to understand why, in the course of natural evolution, so many seeds are equipped with devices—wings, parachutes, barbs, succulent coverings—to provide for their scattering far and wide.

Essentially the same thing is true of animals, though not so easily observable. In the higher forms of animal life the competition between parents and children does not become acute until the latter are partially grown up. Among many types the parents expend enormous energy and make great sacrifices in supplying food to the young, sometimes by giving to their offspring food that they themselves might have eaten, sometimes—as in the case of the mammals—by taxing their resources to provide a special kind of food for the young. The very fact, however, that there is sacrifice and expendi-

ture of energy, indicates that the young are competitors of their parents, and an added cause of struggle. Later on, as the younger generation grows up, the competition becomes more direct and dangerous. The young quail become full-grown quail, the fox cubs become mature foxes. In an area where the parents at best have had to hustle for a living, there are now new and voracious appetites to be satisfied. And the victory is to the strongest, the fleetest, the keenest, which is to say, briefly, to the young. For a time the superior experience and sagacity of the elders may enable them to hold their own, but in the end the young become the agencies for the elimination of the old.

From the strictly materialistic point of view, therefore, it would be better for parents, all up and down the scale of life, if they had no children at all. And it would be better for children if their parents would vanish immediately after giving them birth or at most as soon as they had them well started on their careers.

Instead of which, we find parents in each generation bringing into the world innumerable offspring, some, if not most, of which they will themselves destroy, and the survivors of which will eventually destroy them.

And why? Just because Nature has endowed all her creatures with this overmastering impulse to mate. There is only one other impulse that can compare with it in power and universality. This is the impulse to feed, to seek survival. Love and Hunger—these are recognized by all psychologists as the two basic and indispensable endowments of living creatures. One is essential to the survival of the individual, the other to the

continuance of the species. Both, therefore, are necessary for the perpetuation of life on this planet. How amazing, then, that they should be inherently and persistently antagonistic to each other! Is it any wonder that life is arduous and painful when the two fundamental impulses of life are implacably pitted against each other?

We hear a good deal of talk about "bountiful Nature," "beneficent Nature," "kindly Nature." It is true that Nature (to adopt the personification for the moment) in some of her aspects is bountiful, beneficent, and kindly. But she is none of these things with respect to the provisions for life that she offers on the one hand, and the volume of life that she constantly brings into being on the other. When we think of the expanse of the mountains or prairies, or the volume of the seven seas, Nature seems indeed profuse and bounteous. But when we reflect that she has so constituted her creatures that they are constrained to bring new life into the world at such a rate that a single pair of eels in two years would turn the entire sea into a mass of wriggling bodies or a pair of oysters in the fifth generation would exceed the entire globe eight-fold, then we realize that she is anything but kindly and liberal. Her provisions are utterly infinitesimal compared to those whom she calls to the feast.

Methods of Nature

Of the two great objectives of life—the survival of the individual and the perpetuation of the species—Nature appears immeasurably more interested in the latter. She seems to care not a whit how much suffering

or loss she imposes on one generation provided only that by some means a following generation is assured. She achieves her ends largely by killing.

> "To him who, in the love of Nature,
> Holds communion with her visible forms"

there comes in time the startling realization that one of her most characteristic aspects is that of a gigantic slaughter-house. The processes of Nature are largely one continuous orgy of killing, as anyone can verify for himself if he will establish himself anywhere in the woods or meadows for an hour or two and watch with an appraising eye what goes on about him.

The importance of these truths, for our present purposes, is found in the frequency with which persons, discussing human social affairs, insist that we should get back to Nature, and criticise various social programs because they are contrary to the natural laws. It is exceedingly salutary to comprehend clearly what the methods and processes of Nature are. Then we are in a position to know whether or not we want to get back to them.

The killing that is so constant and so characteristic in Nature takes two main forms. The first is active, direct, positive, aggressive, characterized by pursuit, attack, appropriation, capture. This form is exemplified by the fox stalking a partridge, the pickerel pursuing a minnow, or the sparrow eating grass seed. The second is indirect, passive, often unconscious, but terribly persistent. It is the result of implacable rivalry for the limited supplies of the earth. It is exemplified

by the death of countless seedlings, year after year, "in the shade of the old apple-tree," by the failure of myriads of young oysters to find a suitable footing in the ocean bed, by the heavy toll that a hard season imposes upon the winter birds of New England. The two forms often work together. The individuals who are most weakened by failure in the competition of life are the first to fall victims to the attacks of their enemies. These are the facts, doubtless, that lay back of the famous assertion that "no animal dies a natural death."

A further generalization can now be readily accepted: At any given time there is always as much life in the earth as there can be in view of the forms of life that exist at that time. Since the numbers of each species are never limited by the capacity of the species to reproduce, but always by the capacity of the earth to support, it follows that the earth is always as full of life as it can hold.

Law of Stationary Population

One of the noteworthy consequences of these conditions is expressed in what we may call the "law of stationary population." Simply stated, this law is that every species in Nature, within a relatively short time after its appearance as a separate species, reaches the maximum number that can be supported upon the earth, and from that time on remains virtually stationary in numbers, barring some great cosmic changes that may affect it advantageously or disadvantageously. The meaning of this law can be grasped most easily if we imagine the earth to be all of a uniform character as regards soil,

climate, etc., and upon this earth a single form of plant. Whether this plant produced two seeds a year or two million seeds, in a very short time all the standing room and all of the food that the earth supplied would be called into requisition, and thereafter there could be no increase in the numbers—the population—of this plant, generation after generation. The situation would not be materially affected if instead of one species of plant, there were several. In that case, the factors determining the population of each species would be not merely the qualities of the earth, but also the characteristics of the other species. In other words, the competition of life would come in. Since no two species of plants are perfect and complete competitors, there would probably be a greater total of plant life on earth with several species than with only one. A balance or ratio would be struck up between the different species, each would eventually reach its maximum, and thereafter remain stationary.

Essentially the same principles would hold good with the introduction of a species of animals, or of several species of animals. To a greater or less extent, every living species is a factor in the life conditions of every other species. Not only competition, but cooperation and mutual assistance, exist in a most complicated pattern. There thus arises the "balance of Nature" which has aroused so much admiration among biologists. It is difficult to predict how far modifications in one species may extend their effects among other species.

The situation is not different in principle with a world that is not uniform, but exhibits manifold varia-

tions in topography, temperature, humidity, elevation, soil composition, etc. The chief difference is that no species has the entire earth as even its potential habitat. There is no species, certainly of the larger types, that is so adaptable that it could carry on its life processes in any portion of the globe as it is. Instead of this, each species is adapted to the conditions of a more or less restricted area which constitutes its habitat. The portion of this area that it actually occupies is its true range. The point at which it reaches a stationary population is therefore set, not by the standing room and food of the earth as a whole, but by the standing room and food of its habitat, qualified, of course, by the competition of life afforded by the other living organisms domiciled in the same habitat.

The essential fact to bear in mind is that the law of Nature is a law of stationary population.

Toll of Death

It is because of the universality and inflexibility of this law of stationary population that the toll of death in Nature is so heavy. If a population is not to increase, it means that exactly as many must die as are born. In other words, of a new generation, only so many may grow up to maturity as have places made for them by the death of their elders. The death rate and the birth rate in Nature are always equal. And this toll of death is levied primarily upon the new born. Of the sixteen or sixty million eggs that the oyster produces only two can grow up to maturity, and very few of the others will even get a start. If there happens to be a cotton-wood tree in your neighborhood, you are familiar with the cloud

of downy particles that flies through the air for two or three days each year until the ground for hundreds of yards around seems to have been covered by a light fall of snow. How many more cotton-wood trees are there to-day than there were ten years ago? Very likely not one. Every one of these tiny winged seeds represents a birth, and every one that fails to grow into a tree represents a death. Instances of this sort might be multiplied indefinitely. Among the lower orders of life the infantile death rate invariably falls short of totality by an infinitesimal fraction of one per cent.

As we ascend the organic scale, however, a change is observable. The number of births per parent begins to decline, and the proportion of survivals among the offspring begins to increase. This improvement is accomplished, in part at least, by the introduction of some form of parental care or protection over the offspring. In the lower forms of life, including all the plants and the lower types of animals, the only relation of parent to child after birth is that of direct and remorseless enmity. The young are thrown immediately upon their own resources, and left to shift for themselves. The odds are overwhelming against any individual, and, as we have seen, Nature's method of guaranteeing that the turn will be favorable in one or two cases is to multiply the number of tosses. Chance is the arbiter. But as soon as an intelligence, however rudimentary and feeble, comes in to modify the play of chance, the number of births necessary for the continuance of the species may be reduced, and therefore is reduced, correspondingly.

The growth of the parental instinct is one of the most remarkable and beautiful exhibits that biology has to display. Consider how distinctly preferable it would be, from the parents' point of view, if children were not born at all, or at least died immediately after birth, and then consider how assiduously parents in the higher organic levels labor to nourish their young and to bring them up to the point where they can become their own closest rivals, and you are amazed at the early development of irresistible altruistic impulses. This impulse appears to develop steadily as we ascend the scale of organic evolution. In fact, it would be hard to find a better objective criterion of comparative heights in the order of being than the development of parental nurture with a corresponding period of true infancy.*

Parental Attitude

An old fable relates that a jackal and a lioness were once discussing the inexhaustible topic of their families. The lioness inquired of her friend how many young she produced in a litter. The jackal answered, with some show of pride, "Six or eight—and how about you?" "One," replied the other,—"but a lion!" Whether or not the tale is zoölogically accurate, the moral is sound.

The climax of this development, obviously, is reached

* An interesting illustration of a transition stage is furnished by the giant salamander, *Cryptobranchus*. The male of this species sets himself on guard over the eggs, protecting them from attack. In so doing, he is safeguarding not only his offspring but also his food supply, for both he and the female devour the eggs greedily. Thanks to their slow rate of digestion, the larger portion of the eggs remain untouched and have a chance to hatch.

in the case of the mammals, where the young are carried, safely protected, within the body of the mother until they have passed through several stages of their development, and, when they are introduced into the outside world, are provided with special nutriment directly from the body of the mother for a longer or shorter period, while one or both parents maintain continuous guard over them, shielding them from attack, protecting them from the weather, keeping them warm, and finally giving them elementary instruction in the task of self-maintenance until they are able to face the problems and perils of life on a virtually equal footing with their elders. The methods of the birds are almost as effective. In compensation, the females of these higher species are sufficiently relieved from the excessive strain of reproduction so that they have some time and energy left for other activities.

Terms of Earthly Life

It seems quite clear, then, that whatever power established this globe, and set living creatures upon it, ordained that life upon earth should rest primarily upon struggle. In order that life should persist, two basic needs must be met—the individual must obtain sustenance, and each generation must produce another generation. In order that these two requirements should be fulfilled, two basic impulses have been implanted in all organisms—hunger and love. As a guarantee of the survival of species, the achievements of the one have been made immeasurably to exceed the possibilities of satisfying the other. There are accordingly "two natures struggling within"

every organism. In the realm of Nature, in the narrower sense, we see no indication that any way out of this struggle is either intended or provided for. All we find is a veiled hint that whatever relief is ever to be achieved is to be sought for through intelligence.

CHAPTER II

MAN, THE ANIMAL

UPON this Earth, with its conditions and its limitations, there appeared some hundreds of thousands of years ago a new and peculiar species of animal. Since I, who write this book, and you, ~~who read it~~, happen to belong to this species, we are particularly interested in its origin and its subsequent career. We are, in fact, inveterately disposed to take what, in highbrow language, is called an anthropocentric view of the entire globe and all its denizens. We are inclined to interpret and evaluate all natural phenomena from the point of view of the bearing they will have upon the welfare of the human species. This is perfectly natural, and, if you like, "right" for us. But if we are not on the lookout it is likely to produce some peculiar and dangerous consequences.

First of all, we are likely to ignore, if not actually to forget, the fact that we humans are ourselves animals, and therefore subject to whatever limitations and requirements are inseparable from the bond of the animal organism to the earth. We are so completely unique a type of animals, and we have succeeded in modifying or escaping so many of the restraints that nature lays upon other animals, that we find it difficult to remember, or even to admit, that some things in-

herent in our animal nature have not yet been overcome, and may never be.

It is only very recently that the most intelligent groups of men have been willing to face squarely this question of their animal nature and affiliations. Here and there a venturesome spirit has dared to probe into the secrets. But it has been a dangerous business. It was less than 400 years ago that Servetus was burned to death for presuming to cut up and examine the body of a dead man.[6] All such inquiries were regarded as inherently sacrilegious. Even today, and even in the most civilized societies, there are large numbers of people who regard the frank acceptance of truth, or even the search for truth, in these matters as impious or irreligious. Fortunately, however, the taboo has been sufficiently broken down so that in our day those who wish to know the facts about their animal nature may find a great deal that is both interesting and illuminating.

Animal Resemblances

There are really two questions at issue. The first is that of man's *resemblance* to the other animals. The second is that of his *relationship* to other animals. The truth has made earlier and more rapid headway in the former of these queries than in the latter, because the facts are both more accessible and more acceptable. As soon as man began to regard himself objectively at all, many superficial evidences must have been inescapably obvious. Among the higher animals he must have observed all his external members and organs duplicated with an exactness that made identification inevitable. Though none of the

other animals had two pairs of limbs so sharply differentiated as his own, all of a certain great type had two upper or fore limbs, and two lower or hind limbs. Almost every animal that he would recognize as an animal had a head, most of them two eyes, a nose, a mouth, and two ears. He could see that animals ate, slept, mated, had offspring, and in fact performed all the important bodily functions that he recognized in himself. Very early in human experience men must have become accustomed to thinking of themselves as similar in kind to the other animal species. And such of them as were familiar with the monkeys, or more particularly the great apes, cannot have failed to be impressed with the extraordinary likenesses between these creatures and themselves, just as every modern person, adult or child, is today. It is this remarkable similarity in form, features, expression, and behavior that makes a visit to the monkey cages in the zoo so amusing or so disgusting, according to one's personal reaction.

It remained, however, for modern scientific research to reveal more intricate, and probably on the whole more significant, resemblances. These have to do with the internal organs and all the various life processes, and can be revealed only by dissection and other laboratory methods. Many of the results, however, once achieved and put in simple form, are easily appreciated by anybody who is willing to give the matter a little attention and unbiased thought. Some of the most significant of these resemblances are found among the skeletons of various species of animals, likenesses that

would never be suspected as long as the fleshy covering which composes the bulk of the body remains intact. It is well worth while to spend a few hours in a museum that has exhibits so arranged that these resemblances can be traced. It does not surprise us, of course, to find that the skeletons of the anthropoid apes and even the monkeys are almost exact replicas of those of human beings, as far as the actual parts are concerned, the main differences being in form and proportions. But it does make us open our eyes when we realize for the first time that the skeletons of a dog, a horse, a bird, a bat, a crocodile, and a walrus, have virtually the same important bones, arranged in the same general order as the skeleton of a man—such as a skull with a separable lower jaw, a backbone, ribs, two shoulder blades, a pelvis, and bones of the fore and hind limbs strikingly similar even down to the details of the "hands" and "feet."

Every student of elementary biology knows that all the important lessons about the bodily processes of human beings may be learned from the body of a rabbit, a pigeon, or even a frog. There is the same heart that beats, lungs that breathe, stomach and intestines that digest, brain that controls, nerves that transmit, muscles that perform, sexual organs that reproduce, and so on through a long series that includes everything except the most specialized human features.

Animal Kinship

It is not necessary, however, to spend a great amount of time on the consideration of the mere likenesses between man and the other animals. As already observed, the facts in this field

have already ceased to be controversial and are at least partially apprehended and accepted by every intelligent person. But the situation is very different with respect to the question of man's relationship to the other animals. Here is where human pride and self-esteem impose the greatest obstacles. In all matters where our human feelings are not involved we are quite ready to accept striking likenesses as at least presumptive evidence of kinship. It is a favorite trick at the dog shows to have the littlest dog in the show photographed perched on the head of the largest dog. This striking dissimilarity in size, however, along with other differences, does not hinder us from accepting the doctrine that all dogs are related. We are quite willing to believe that all birds are related, even though they differ as widely as a humming bird, a penguin, an eagle, and an ostrich. In fact, we are not averse to recognizing some degree of kinship among all animal types. But confront us with a gorilla or a chimpanzee and the natural reaction is to rebel against the implication that the striking resemblances that we cannot help recognizing are evidence of kinship between the ape and man, or, specifically, ourselves. Yet the differences between a gorilla and a man, particularly a man of some of the dark-skinned races, are much less marked to an impartial eye than those between a Pekinese and a greyhound, or between a wren and a pelican.

Some definite conclusion on this point is absolutely essential to a well-rounded science of social life. For if it be true that man is fundamentally a different sort of creature from the other animals, then we may ex-

pect a different set of principles to govern his relation to the earth upon which he spends his days. But if, on the other hand, he is of the same basic stuff as the lower creatures, then it would seem inevitable that the universal features of the life-land nexus should apply to him too.

First of all, let us face squarely the meaning of relationship or kinship. When applied to organic beings these terms imply that the two or more types or individuals in question are descended from the same source if their ancestry is traced back far enough. In popular and conventional parlance, they have the same "blood" flowing in their veins; in more modern and accurate language, they carry, and are the product of, the same "germ plasm." The more closely related any two individuals are the more recently in their descent can a common ancestor be found. Thus brothers and sisters are more closely related than any other kindred for in the first generation back they have both ancestors in common. Half brothers and sisters have only one ancestor in common in the first generation. In the case of first cousins it is necessary to go back two generations to find a common ancestor, and then two are found. And so it goes, indefinitely. It is obviously a very complicated matter, especially when we reflect that theoretically the further back we go the more ancestors we have. Every person has two parents, four grandparents, eight great-grand-parents, sixteen great-great-grand-parents, and so on in a geometrical ratio. Imagine how many ancestors you must have had at the time of Christ, or in the days of the Cro-Magnon culture,

or in the dim dawn of human existence half a million years ago! And each of your contemporaries must have had the same number. It would seem as if the further back in antiquity we go the more people there must have been, whereas we firmly believe that just the reverse is true. The answer to the paradox, of course, is furnished by the fact that many of the ancestors of you and of your contemporaries were identical, and the further back you trace your ancestry the wider becomes the circle of your present kinship. That is, there might be living today say three other persons who have the same father and mother as yourself, perhaps a dozen or sixteen who have the same grand-parents on one side and an equal number who have the same grand-parents on the other side, that is, a total of say thirty who have the same grand-parents in general, possibly one hundred and twenty who have the same great-grand-parents, and —well! this is getting to be a problem in higher mathematics, and we may discreetly drop it. But the point is clear. If we go back enough generations all living human beings would have common ancestors, and these need only have been two. In other words, all mankind today would be of one kin, and descended from a single small group of ancestors living an undetermined number of hundreds of thousands of years ago. And this is exactly what most authorities on the subject believe.

But more of this later on. The question at issue at the present moment is whether the facts warrant us in believing that the same principle may be extended to indicate a common ancestry of the human and the non-human types. Suppose it to be true that if we go far

enough back we find common ancestors (broadly speaking) of all the white men of today, and if we go still farther back we find common ancestors of all kinds and conditions of men—is it likewise true that if we go still further back we should find common ancestors of man, and the anthropoid apes, and back of that common ancestors of man, apes and monkeys, and then common ancestors of all the mammals, and then of all vertebrates, and then of all animal forms, and finally common ancestors of every type of living organism? In brief, is man related not only to the primates, not only to all the higher forms of animal life, but to every type of living organism? This, as you have already recognized, is the great question of evolution in its broadest aspect.

There is not as yet sufficient unanimity of opinion on these great questions to justify us in accepting any categorical answer with perfect confidence. But we may say with complete assurance that there are enough reliable and scholarly searchers for truth who believe that the answer to each of these questions is in the affirmative to warrant us in considering carefully the evidence upon which their judgment is based. What, then, in general, is the evidence pointing to the conclusion that man is physically related to the lower animals, that like forms of life have a common ancestry, and finally that all types of organisms that exist or ever have existed are descended from one, or at most a very few primordial forms of life?

The evidence of evolution presents itself in three great types, each with its associated group of facts.

The first is Morphological. This type includes all those facts which go to establish a similarity between man and the other living forms. These have already been considered and need not be dwelt upon further. We may simply observe that the volume of such evidence is overwhelming, that it is a very convincing form of evidence, just the sort of thing that the unsophisticated mind accepts without question where no personal issue is involved, and if it concerned any non-human problem would leave no doubt in the minds of the great majority of human beings.

Evidences of Evolution: Morphological

The second type of evidence is archæological. It includes all the facts that reveal the actual forms of the members of the human species at different stages of its development as far back as they can be traced. Research along this line calls to its aid several different sciences. First of all, it enlists the science of history. This science assembles, classifies, digests, and interprets all those records of man and his doings which are thoroughly authentic. The earlier tendency was to restrict history only to such evidence as was based on a written language preserved in permanent form. The whole stretch of time in the career of any people during which such records are made and kept was commonly referred to as the "historical period." Obviously this period differs greatly among different peoples and in different regions. It is much longer, for instance, in the case of the Egyptians than of the Eskimos. Nowhere, however, does it go far enough back to cover more than a very minute

Archæological Evidence

portion of the entire span of man's existence. Written history, accordingly, will not be able to carry us very far in our inquiry into the ancestry of man. In point of fact, as far as written evidence is concerned, we find very little to indicate that man was any different in the past from what he is now. The earliest written records seem to reveal man as an animal virtually identical with his present forms, all the important races being fully developed and each displaying the same characteristic features by which we identify it today. This conclusion is supported by the fact that on the walls of ancient Egyptian tombs 4000 years old there are paintings showing various racial types that can easily be identified with those now inhabiting the region. Lothrop Stoddard describes a set of little clay figures that he examined, found in Egypt and dating from about 600 B.C., which showed clearly the different racial features, though there were some that could not be assigned to any living races now known. The modern tendency, however, is to give the term history a much wider scope, and to include in it all the undisputed testimony of the past, even though it be in the form of a primitive eolith. In point of fact, we have to go far back of written documents to find any significant grounds for believing in man's kinship with the lower animals that could not be derived from contemporary man.

We turn next to the science of geology, upon which we depend for our chronology in ancient times. In interpreting the various forms of archæological evidence it is highly important that they should be dated.

Such dates will not be exact. The more remote of them will not be expressed in years but in ages, eras, or periods. But they will furnish the basis for determining the priority and sequence of various pieces of evidence and so enable us to get an idea of lines of development.

Other sciences that will be called upon for aid are anthropology, which is essentially the study of man as an animal; ethnology, which is the study of the races and peoples of mankind; and of course zoology, biology, and geography.

Genuine archæological evidence, then, consists of the records of himself that man left before he was able to leave written records. What are these evidences? We find that they fall into two main classes. First, the remains of man himself—his physical body—and second, the remains of various things that he had made, or his "artifacts." It is obvious that the former of these are immeasurably the more important. The testimony of the artifacts must be secondary and implicit; they help us to answer the question, "What kind of a man would presumably have made and used this particular kind of a thing—a bone needle, a flint scraper, a stone hammer?"

Fossil Man

The remains of human bodies that have survived from ancient times are almost exclusively skeletons or portions of skeletons, and in some instances teeth. The bony framework of the body is the only part that is durable enough, even under the most favorable conditions (exclusive of permanent freezing) to resist the forces of decay and dis-

integration. It is fortunate, therefore, that the skeleton is the most significant part of the body for the purposes of comparative anatomy, and a remarkably reliable indicator of the form of the body itself. Of the skeletons, furthermore, by far the most important portions are the skulls. This is partly because the skull is a peculiarly durable piece of bone, and much more because the skull tells a more varied and convincing story than any other portion of the skeleton. Man's most characteristic development has been in his head. Much the most striking differences between man and his nearest kinsmen are associated with the head, externally or internally. The skull is the only portion of the skeleton that gives direct testimony as to the intelligence of the possessor. The archæological evidence, consequently, consists primarily of a number of skeletons or parts of skeletons, and particularly skulls, arranged in their chronological sequence by the aid of geology, which reveal the course of the development of the human body. It is not consistent with our present purpose to go into the fascinating question of how these ancient remains were preserved in caves, river sands, etc., nor to peruse the thrilling romance of their discovery and accumulation, but simply to consider what they have to tell as to the progressive stages through which man's body reached its present form.

It is a striking fact that the source of the great majority of these primitive remains which have been recovered is Europe, and particularly western Europe, including the British Isles. This may be due in part to a genius inherent in the peoples of this territory to de-

vote themselves to such researches, and partly to topographical, climatic, and other physical conditions favorable to the preservation of such remains. It certainly can not be due to a longer human residence in these regions than in other parts of the globe, for, as we shall see, man probably originated in a region far remote from western Europe. As a consequence, the different types into which these remains naturally fall are mostly called by European names, derived from the regions in which the characteristic specimens have been found.

One of the most recent of these types is that known as the "Aurignacian Race," or more commonly from its best known example as the "Cro-Magnon Race." This very interesting group of people lived in southern France some 25,000 years ago. About forty skeletons of this general type have been discovered. They reveal a race of men not so strikingly different from those with whom we mingle today. The forehead was probably a little more sloping, the lower jaw a little heavier, and the arms slightly longer in proportion to the body. But it is interesting to note that according to the evidence of the skulls they had an inherent brain capacity little if any inferior to modern man. They were a tall race, the average stature being considerably greater than that of the modern Frenchman. They were decidedly long-headed. Their civilization was very primitive according to our standards, but they had developed great skill in the manufacture of various implements of flint and bone, including not only the basic scrapers, hammers, arrowheads, etc., but also bone needles, dart throwers, and a

bone tally for keeping a hunter's record. Furthermore, they had developed a pictorial art of a surprisingly high order. Considering how little of past achievement they had to build on, we must conclude that they were people of great natural endowments.

The next more ancient type to be clearly distinguished is the Mousterian Race, best known by its Neanderthal and Heidelberg specimens. In this type we find the ape-like features much more marked. The profile was so sloping as clearly to merit the appellation of "low-brow." The bony ridges over the eyes were very prominent, the lower jaw heavy and massive, and the chin practically absent. The backbone had a simple curve of distinctly ape-like character.

Still more primitive, at least in some respects, was the race of men living in Sussex, England, who left the few skeletal traces from which has been reconstructed the famous "Piltdown Man."

Finally, the most remote of the series, we come to what is probably the most famous bone the world has ever known, the top of the skull of a very primitive creature discovered by Professor Eugen Dubois in Java in 1891. Associated with it in such a way that it evidently belonged to the same individual or another of the same kind were a thigh-bone and two teeth. To one not thoroughly trained in anthropology or comparative anatomy it is almost inconceivable that these few fragments should furnish a sufficient basis for reconstructing the entire skeleton, and even the body itself, of the creature to whom they belonged. Yet to the expert this is just as simple a matter as it is for an experienced

automobile mechanic who picks up a characteristic piece of an automobile to tell you just what kind of a car it came from, and to describe that car in detail. This is not to say that there was no uncertainty and no controversy about this "Trinil Race,"—for there certainly was. There was a very heated debate as to whether this creature was human at all. To one group of observers he was clearly an ape, though with some strikingly human characteristics; to another he was undoubtedly a man though with some remarkable ape-like features. Even his name reveals this perplexity, for he was christened *Pithecanthropus Erectus* or the "upright ape-man." In the end, after exhaustive and painstaking study, it has been pretty conclusively established that the Trinil race was definitely human, though of such a very primitive type as to constitute a genuine "missing link." Very recently the scientific world was startled by the announcement of the discovery of a complete skull of this race. Up to the time of writing, however, this discovery has not been confirmed. The best judgment seems to be that the bone in question was part of an elephant's knee joint.

Altogether, upwards of 136 skeletons of fossil men are known and have been studied.[7] If you had all this remarkable collection arranged before you in chronological order you would be able to discern certain definite and constant tendencies in their form. Beginning with the skeleton of a modern white man and running back to *Pithecanthropus Erectus* you would observe certain changes taking place with convincing regularity. The most important and impressive of these would be

in the skulls. The forehead in general would become more and more sloping, the jaws (not the chin) more and more projecting and heavier in proportion to the skull, the ridges above the eye-sockets more pronounced, the cheek-bones higher, and the relative brain capacity smaller. All these would be quite obvious to the layman. An expert could point out many other very significant changes. Turning to the rest of the skeleton you would find the arms growing relatively longer in proportion to the legs, the backbone losing its human S curve and tending toward a single curve with a corresponding stooping posture of the body, the jointure of the backbone with the skull coming farther back on the skull, the pelvis losing its cup shape, and the femur becoming curved.[8]

In brief, if you had before you all the prehistoric human skeletons that have actually been discovered you could trace in them a quite regular progression from the most ancient one known, which is almost as much like an ape as a man, down to the present highly developed type. When you recall that these finds are scattered over a period conservatively estimated at 500,000 years you realize that they represent a very parsimonious sampling taken from countless millions of individuals who lived during that long stretch of time, preserved and made available to modern research purely by what we call chance. The skeptical will naturally inquire, "How do we know that these samples are representative? How do we know that if we had several dozen specimens from every generation of men that has ever lived they might not show something very different?"

The answer is frankly that we do not know. "Know" is a very big word. It is all a question of the most probable and the most reasonable interpretation of the evidence we have.

Many things in life can be observed only as tendencies. We can observe a process, a movement, or a development over a period of time but we cannot actually observe either its beginning or its end. Our conception of the beginning and the end must depend on the projection of the tendency in one direction or the other. But in all affairs that are governed by natural law our common sense and our experience lead us to assume that if, during the period of observation, a definite tendency or trend can be clearly discerned, the same tendency must have existed before the period of observation and will exist in the future—provided, of course, that there is no reason to suppose that different factors were, or will be, involved. If you are exploring a brook and find that as you proceed in one direction it gets steadily smaller and higher you feel quite certain that if you went far enough you would get to some high point where it dwindled away to practically nothing. You would not believe your eyes if you were to find it going lower and becoming larger. If you have watched a vine growing on a wall, and month after month, year after year, have seen it climb up and up, you would be very much surprised if when it was half-way to the top it should suddenly begin to grow down.

Tendencies

So it is with the evolution of man. All the evidence that exists shows a tendency to develop along certain

clearly defined lines. At one end of this development, within the period of most intensive observation, is modern man. At the other end is *Pithecanthropus*. Until some evidence to the contrary is adduced, it is entirely scientific to assume that if the line of development could be traced still farther back the same general tendency would display itself, and we should eventually come—not to a monkey, by any means, nor even to a duplicate of any of the existing apes, but to a creature that might easily have been a common ancestor of man and the modern apes. Having thus gone back quite out of the human realm, there is nothing to prevent acceptance of the doctrine that unbroken development could be traced farther and farther back indefinitely. Turning in the opposite direction it is by no means so certain that the same tendencies will continue indefinitely into the future, for, as we shall see, new factors have been introduced, largely by man himself.

Embryological Evidence

The third great body of evidence in favor of the belief in man's kinship with the animals is Embryological. This is a kind of evidence that has been made possible only by modern scientific methods, but, to one who is intelligent enough to grasp it, it is the most convincing of all. As the name implies, it is based upon the study of embryos, that is, living creatures before they reach their final independent form.

The Cell

As a first step toward the comprehension of this testimony it is necessary to consider briefly the nature and significance of the cell. The cell is the smallest particle of living matter that

can have an independent existence. Many species of organisms consist of only one cell; none consist of less; the great majority consist of multitudes. Minute as it is, the protoplasmic cell is a very complicated thing. For our present purposes it is not necessary to linger on the details of its constitution. It is sufficient to note that it consists of two main portions, an inner one called the nucleus and an outer envelope called the cytosome. The nucleus appears to be the more vital and significant part of the cell; in fact, for most of the purposes of social science the cytosome may be disregarded and the cell treated as if it consisted of nucleus alone.

Perhaps the basic truth of biology is that every living organism, of every known species, starts its individual existence as a single cell. How this cell comes into being, and what its special characteristics are, we shall have occasion to inquire later. Some species, as already observed, never develop beyond the one-cell stage. Every student of elementary biology or zoölogy is familiar with some of these creatures, particularly the paramœcium and the amœba. The great majority of organisms, however, including all those which are presumably near of kin to man, have bodies composed of a vast number of cells. These body cells (somatoplasm) have all been produced by the reproduction of the original cell, and may in one sense be considered as its offspring. For every living cell, whether it exists as a unicellular organism or as part of the body of a multicellular organism, is an independent creature with a life of its own and powers of growth, nutrition, and multiplication. In the multicellular species the descen-

dants of the original cell very soon begin to diversify and specialize. Some are evidently destined to become eyes, others limbs, others brain, others vital organs, and so on. This specialization continues until the composite mass of cells, now of many different sorts, reaches the stage of development characteristic of the species in question in its virtually final form.* At this point embryonic life ceases and we customarily say it is "born." There may be yet many changes to be undergone, but these are mainly matters of size, proportions, etc. The individual is clearly identifiable as belonging to a given species, and assumes a free life of its own.

Recapitulation

Now the remarkable and significant thing about this growth of the embryo from a single cell to the free infantile form is that in each particular species the embryo goes through a series of forms corresponding to all the forms that the species itself is believed to have gone through in the whole course of its evolutionary development. They all start with a single cell, just as all the known forms of life are supposed to have descended from an original one-celled primordial organism. For a time thereafter the embryos of different species are scarcely distinguishable from each other, just as the first divisions of the primeval protoplasm were not sharply differentiated. Little by little, however, the lines of cleavage become more marked, but in each case the embryo, whether of fish, amphibian, bird, or mammal, shows in its successive stages the features of the different forms of life

* Though there are, of course, numerous species which display one or more metamorphoses into quite dissimilar forms.

through which its own species has evolved. This marvellous truth is usually known as Haeckel's biogenetic law, in honor of the scholar who first propounded it, and may be briefly summarized in the words, "Ontogeny repeats phylogeny."

This fact of recapitulation, having been firmly established by the researches of many investigators, has now become a means of unraveling the evolutionary history of any given species. Applied to the case of man it gives seemingly unimpeachable results. The development of the human embryo has now been fully studied and recorded—how sacrilegious such an investigation would have been thought only a few generations ago! There is no doubt about the stages through which it passes. It begins with a single cell. This cell proceeds to multiply. Soon a slight differentiation is apparent, but at first the changes are almost identical with those in the embryos of any of the animals. Gradually more marked specialization appears. There is an unmistakable head and tail. Limbs begin to bud, gill clefts are formed, the spinal column becomes well defined, eventually the hands and feet become differentiated, the features of the head and face appear, until finally, just before birth, the little mannikin possesses virtually all the members and organs that he will ever have. In the successive stages of this development the human embryo is scarcely distinguishable from that of more or less closely related other species, and, even more striking, there are certain features which are characteristic of some of the lower species but wholly lacking in the normal man. Thus, as mentioned, at certain points of de-

velopment there are gill clefts, such as may be seen in adult fish or in the larval stages of salamanders or frogs, and tails such as may be seen in adult apes. Normally, these features disappear before the human infant sees the light of day, but occasionally they persist after birth as unwelcome reminders of our diversified relationships.

If you will take Professor Lull's book, "Organic Evolution," and turn to pages 664 and 665 you will find there some pictures that tell the story far more convincingly than could be done by pages of printed matter. You will realize that if the pictures of the early embryos of the fish, salamander, tortoise, chick, hog, calf, rabbit, and man were printed on separate slips of paper you would have to study them very carefully before you could tell which was human, and even then your identification would be based purely on memory, and not at all on any greater resemblance of one of them to a human being. And you will be struck by the extraordinary resemblance between the rabbit and the human being at a fairly advanced stage of development. You can then ask yourself squarely the question, "If man is a separate creation, entirely unrelated to the lower animals, what possible explanation, or, if you like, reason, can there be for having his embryo develop gill clefts and a tail, and so many other features identical with those of the lower animals?" Does not the evolutionary answer stand the test of common sense better than any other?

And after all, why should it be either so incredible or so unacceptable? An opponent of evolution in a

public speech exclaimed with deep emotion, "I shall never consent to the doctrine that I am descended from a one-celled animalcule!" The reply is obvious. Every one of us, by incontrovertible evidence, is developed out of a single cell in nine months within the body of his mother. To deny that is simply to proclaim oneself immune to facts. Is it any more remarkable or any more discreditable that our species should have evolved from one-celled animalcules during a period of countless millions or billions of years with all the influences of air, land, and water to help us?

This is obviously a very sketchy review of the evidence in favor of the evolutionary theory as applied to man. But it is sufficient to indicate the kinds of facts that support this doctrine, and possibly to inspire you to go into the subject more deeply on your own hook. If you do, you will find a great many scattered pieces of evidence of various sorts, such as the fact that a three-weeks-old baby will hang by its hands for over two minutes in a strikingly simian attitude. And it is certain that the farther you probe the more you will be impressed with the completeness and the growing invulnerability of the evolutionary interpretation.

Anti-Evolutionary Evidence

So far we have confined ourselves to an examination of the evidence in favor of the belief that the evolutionary interpretation applies to man. We must now ask, What is the nature of the evidence opposed to this belief?

Just as the most abundant and convincing evidence of man's kinship with the lower animals consists in likenesses of various kinds so the most impressive evidence

to the contrary consists in differences. Of these differences we are intensely conscious. We are also prone to overestimate them because of the anthropocentric viewpoint already referred to. We see man building great cities, writing great books and plays, painting great pictures, composing and rendering symphonies, inventing radios, drawing comic strips, and performing innumerable other unique feats. We hear man described as the "tool-using" or the "tool-making" animal as a completely differentiating term. We are conscious in ourselves of a thousand capabilities, emotions, aspirations that we do not conceive of the other animals as sharing. It is not strange that we ask ourselves, "Can such a creature as this, made 'a little lower than the angels,' be of the same flesh and blood as the beasts that perish?" Surely there is an amazing gamut of differences between man and his very closest of kin, if kin they be.

Degree and Kind

As a preliminary to interpreting these differences it is well to be on our guard against two persistent fallacies. The first is the assumption that there is a significant distinction between a "difference in degree" and a "difference in kind." In arguments on a great variety of subjects it is commonly taken for granted not only that a difference in kind is entirely separate from a difference in degree but also that it is decidedly more significant. In point of fact, however, there are innumerable instances in which it is impossible to tell whether a given difference is one of kind or of degree, and in which a seeming difference in kind is the product of a gradual, progressive

change in degree. For example, water and ink are clearly two different kinds of liquid. But suppose I have here a bowl containing a glassful of pure water. Into this I drop a single drop of ink. The fluid is still water. You could drink it, or wash your hands in it, or use it for any of the practical purposes to which water is put. I add another drop, and these conditions still remain true. But if I continue drop after drop in the course of time there will be a liquid which obviously is not water, but would admirably serve the purposes of ink. Yet it would be impossible to indicate the particular point at which a change in kind took place. An even more striking example is furnished by water itself—that is the chemical compound known as H_2O. To one who did not know their relationship, there would seem to be a greater difference in kind between ice, water, and steam than between, say, lead, butter, and cloth. But the only difference between ice, water, and steam is one of degree—degree of temperature—and in this case each change in seeming kind comes suddenly at a fixed point. The truth is, then, that in many cases what is for all practical purposes a radical difference in kind may be the result of long continued minute changes in degree.

Character and Achievement

The second fallacy alluded to is the failure to make a distinction between innate differences and differences in achievement. Innate differences, as the word implies, are inborn differences, that is, differences that exist irrespective of all environmental influences whatsoever. It is not strictly accurate to say that they are differences that exist at birth, for

environmental influences begin their work before birth, but this is a rough approximation, and will serve our present purposes. Every sentient creature possesses certain qualities which are his because of the particular germ plasm that composed the embryonic cell out of which he has grown. He has another set of characteristics which are the result of experience, training, and direct adaptation. Kinship is obviously a matter exclusively of the innate qualities. Differences in achievement, instead of indicating relationship, tend to obscure it.

The only differences between a man and a gorilla, for instance, that are significant from the point of view of relationship, are those that exist in the infant at birth, including, of course, latent qualities that are not yet observable but are destined to develop as the organism grows, under the influence of the environment. As far as concerns what we are accustomed to call "physical" traits these differences, as we have seen, are of a distinctly secondary order, by no means sufficient to justify the denial of kinship. The differences that are significant, we are inclined to think, are those that are "mental" or, possibly, spiritual. It is in these upper levels of existence, we believe, that there is a great gulf fixed between man and the highest of the other creatures. But just here it is imperative to make the distinction between innate qualities and achievement. Most of the features that seem to set man off so definitely in a class by himself are really matters of achievement, that is, they are the product of education, training, imitation, and, most of all, of the accumulated and

preserved experiences and accomplishments of past generations. Let us glance at one or two of them.

Language

Foremost in the list stands language. Not only is this a notable achievement in itself, but it is an essential factor in most of man's other achievements. The question at issue is, how completely does it mark men off from the other animals? Do other animals talk? A concise answer to this query has been given in the following words: "Elementary speech is a not infrequent possession among the higher animals. According to Dupont, fowls and doves have twelve different sounds, dogs fifteen, horned cattle twenty-two, while the vocabulary of the unlearned man does not consist of more than 300 words. The language of apes, who chatter unceasingly, quarrel, and play pranks on one another, is composed, according to Garner, of twenty sounds, supplemented by countless gestures and lively mimicry." [9] It would be absurd, however, to claim that there is any close comparison between man's accomplishments in the way of language and that of any other animal. But this is not the main point. The point is that every man today learns his language, and his father learned it before him, and his grandfather, and so on back through uncounted generations. Language as we know it today is a cumulative product, the result of a "snow-balling" process stretched over innumerable tens of thousands of years. In the beginning the changes from generation to generation were undoubtedly infinitesimal. But, as the once popular song puts it, "Every little bit added to what you've got makes just a little

bit more." The nature of language is that its gains are likely to be made permanent. Each successive generation had just a little broader foundation to build on than the one before. So a very minute original innate difference in man's equipment may have been enough to cause his pathway to diverge from that of his next of kin. The ascent of that pathway in our time to an almost incomparable height may not have involved nearly as wide a differentiation in innate qualities as we are inclined to suppose.

Two well-established facts are pertinent in this connection. The first is that a man, entirely cut off from human association from the moment of birth (suckled by a wolf, if you like) would not talk, and *could not* talk. The second is that the apes not only have "vocal organs . . . similar to the human, and . . . capable of producing sounds varying widely in pitch, quality, and volume," and not only have a limited basis of communication of their own, but they have in a few cases been taught to speak a few words of man language. "In the case of the orang-utan it took at least six months of daily training to teach her to say 'Papa.' . . . At the end of about six months, one day of her own accord, out of lesson time, she said, 'Papa,' quite distinctly and repeated it on command. Of course, I praised her and petted her enthusiastically; she never forgot it after that and finally recognized it as my name. When asked, 'Where is Papa?' she would at once point to me or pat me on the shoulder. One warm summer's day I carried her in my arms into a swimming pool; she was alarmed at first but when the water came up to her

legs she was panic-stricken; she clung with her arms about my neck, kissed me again and again and kept saying, 'Papa! Papa! Papa!' Of course, I went no further after that pathetic appeal." This ape also learned to say "cup." "Once when ill at night she leaned out of her hammock and said 'cup, cup, cup,' which I naturally understood to mean that she was thirsty and which proved to be the case." [10] It should also be noted that in the other aspect of language—that of hearing and understanding—not only apes, but horses, dogs, and a variety of other animals become very proficient.

Another of man's outstanding achievements is his industrial system. The distinctiveness of man's use of tools has already been alluded to. We shall later see something of its development. At present what is to be noted is that this, like language, is the result of a long series of gradual, hard-won improvements. Neither Pithecanthropus himself, nor the most wizard-like modern captain of industry, could have constructed it all at once out of nothing. Our industrial system does not represent the difference between a man's brain and a gorilla's, but, one might say, the aggregated differences between countless millions of men's brains and a gorilla's, put out at compound interest.

And so we might go on through a long list of human achievements, with the same result. This is not to say that there are no differences between men and the next higher animals—far from it. Of course there are differences; otherwise there would never have been a human species. But we must not let the differences in achievement deceive us as to the differences in kind.

Because one bear can ride a bicycle and career about on roller skates we do not regard him as of a different sort from his brother who can not; the seal who can juggle balls on the tip of his nose is still a seal. Strip off from mankind all that represents achievement, leaving only the actual basis for that achievement, and the gap between man and the other animals would contract amazingly. A very slight difference in degree will in time produce stupendous results. By way of parable, let us imagine two brothers, each possessing a vast piece of fertile land. The only difference between them is that one owns a single grain of wheat, the other nothing—a completely trivial distinction. But at the end of fifty years one may be rolling in wealth and the other languishing in the poor-house. Just a parable, but it emphasizes how slight an initial differentiation may have set man on the first stages of the pathway that led to world domination.

The actual differences, physical and mental, between man and the other animals have become the object of extensive and exhaustive study by numbers of qualified researchers. As the years go by we shall know much more about the matter than we do at present. But the indications are that the more we learn the less we shall find in the differences between man and the other animals to discredit the evolutionary theory.

Other types of evidence opposed to the evolutionary theory are few and vague. There is religion, and there is tradition, and there is intuition. But all of these operate on a different plane from science, and their testimony is not comparable. There are those, to be sure,

who prefer their evidences to those of science, and find them convincing. But since this particular chapter is meant to be confined strictly to the scientific plane, all non-scientific witness must simply be disregarded.* Suffice it to say that from the scientific point of view the evidence is overwhelming on the side of the acceptance of the general evolutionary interpretation of man's development and from now on we shall proceed with our discussions as if it were true.

* (See page 143.)

CHAPTER III

THE GREAT DISPERSION

If it be true that the human species has evolved from an early, non-human, ape-like form there must have been a beginning. At some time or other there must have commenced a process which, in its culmination, made it possible to say, "That which was not human is now human." This does not mean that even if we had complete knowledge we should be able to put our finger on a point and say, "On this side lies humanity, on that, non-humanity." This would not be possible any more than it would be possible to say when the fluid in the bowl ceases to be water and becomes ink. For a long time it is inky water and for a long time it is watery ink. For a long time this new kind of animals were apes with budding man-like qualities; for another long time (extending right down to the present moment, says Clarence Day in "This Simian World") they were men with lingering ape-like qualities. It is neither possible nor important to draw a dividing line.

But it is important to understand how new species come into being. It was Darwin, as is well known, who gave us the first insight into this process. Darwin's explanation has been modified in many important details as the result of sub-

Origin of Species

sequent study, but its basic features still remain intact. The cornerstone of the theory of evolution is found in the fact of universal struggle to which attention has already been paid. This struggle in nature is so keen that for every living creature the margin between success and failure, between life and death, is a very narrow one. And since a large part of the struggle consists in rivalry between creatures more or less alike, but always slightly different, it follows that of several competitors for a livelihood that one will win out which is most closely adapted to the environment. For those who do not win out there is only one alternative—extinction. The result is summed up in that familiar Darwinian phrase, "the survival of the fittest." The cumulative effects of this competitive struggle over countless generations produce an almost incredible exactness of adaptation. But it should be carefully noted that the fitness which leads to survival is a fitness only *for survival,* and only for survival in a particular environment. It is not necessarily fitness for anything else whatsoever. We have already seen that out of each generation of offspring of every species there are always enough fitted to survive in each particular environment to crowd that environment to the limit of its power to support the existing forms of life. And so the world is always as full of life as it can hold under the conditions.

Chance for a New Species

The question naturally arises, How, then, does any new species get started and establish itself? How can there be room for another form of life in a world already full? The answer to this question is made clearer if we think of the world

as composed of an innumerable, almost infinite, number of niches, each niche capable of offering support to a form of life that will fit into it exactly. Every form of life, to obtain survival, must be able to fit into some existing niche. But it does not follow that even after countless ages of evolution in the forms of life every available niche has been filled, nor even that those niches which are filled are occupied by the most perfectly adapted types possible. If another form of life, still better adapted, comes on the scene it will be able to crowd itself in. It is this relative aspect of adaptation that has led some persons to prefer "survival of the *fitter*" to "survival of the *fittest*."

A homely example will serve to show how there may still be room in a thing that is already full. Suppose we have here a bushel basket, full of potatoes. We shake it down thoroughly, and heap up the potatoes; there is no doubt that it is full. But we can now take some dried peas and by careful handling and shaking pour, possibly, several quarts of peas into the basket that was full, until it is full again. Next we may take fine bird-shot and pour several pounds of bird-shot into the full basket. Finally, if the basket is water tight, we may pour in a considerable amount of water.

So there is always room in the full world for a new form of life, provided that it is sufficiently different from the existing forms to find an unoccupied niche, or that it is sufficiently superior in adaptation to some existing form to crowd it out of its niche.

The possibility of progressive adaptation rests upon the infinite variety of living creatures. In the absolute

Variation, Selection and Adaptation

sense, no two individuals of the same species, even though born of the same parents, are ever exactly alike. In accordance with the law of chance, the offspring of a given parent tend to vary from the parent in every possible direction, and with reference to each specific trait of the parent. These variations, however, tend to be grouped around the mean represented by the parent. The smaller the variation, the more numerous will be the offspring who show it. The extremes of variation will be reached only by an occasional individual here and there. Take, for example, a rabbit of the common "cotton-tail" variety. This parent rabbit has certain individual qualities. It can run so many miles an hour; its eyesight has a certain keenness; it requires a certain amount of food daily; its legs have a certain proportion to its weight; its fur has a certain thickness, and so on almost indefinitely. Every one of its offspring will vary, from the parent, however minutely, in every one of these particulars. In the case of the great majority of the young these variations will be too minute to be of significance even in the fine balance of nature, or else they will offset each other, a favorable variation being counterbalanced by an unfavorable one. But from time to time there will appear a young one, who will be blessed with some variation, or set of variations, that gives him a distinct advantage in the competition of life. It may be a little greater speed, or a little keener vision, or a coat that blends in with the grass a little more completely. Whatever it is, it may, and in the long run will, suffice to turn the balance in his fa-

vor. Of all his litter, he will be the one to survive to maturity and become a parent in his turn.

But now we have a new mean from which the next set of variations will depart. The young of this rabbit will tend to vary in every direction from his own traits rather than from those of his parents (their grand-parents). Thus there is a chance for some trait to be pushed still further in an advantageous direction. Granted unlimited time, it is believed that entirely new forms may be produced by minute cumulative variations.

One important modification in the strict Darwinian theory of evolution that has been made in recent years is involved in the concept of "mutations" or "sports," developed by De Vries. These are sudden and extreme variations occurring spasmodically, and due apparently to some unexplained disturbance in the germ plasm. By a single leap quite diverse forms are thus established which breed true thereafter. In so far as these mutations are the actual means of the development of new species, rather than minute continuous variations, the principal effect would seem to be to shorten up the time necessary for a given evolutionary development to take place.

In this connection it is helpful to remember that the general theory of evolution presents two distinct aspects. One is the proposition that existing forms have grown out of antecedent forms by a continuous process of unfolding or outrolling. The other is a statement of the means or method of this unfolding. There is much greater unanimity of opinion among scientists on

the former of these points than on the latter. The theory of mutations is not the only modification that has been suggested in the original formula of Darwin. It must be confessed that it puts a heavy strain on the imagination to believe that such complex instincts as are described on page 165 represent nothing more than the cumulative products of minute chance variations.

Creative Environment

In a certain sense, therefore, it can be said that the environment creates the forms of life that exist in it by prescribing the various traits, and combinations of traits, that will permit survival. But the environment can work only upon the material that the heredity of organic beings furnishes. This being the case, it is clear that while a suddenly changing environment will destroy the life that exists within it, a slowly modifying environment will produce corresponding modifications in its inhabitants. For example, a lake that is drained by the sudden breaking of a dam leaves its fish and other aquatic creatures gasping to death in the mud. But a lake that was gradually drying up over a period of hundreds of thousands of years might very possibly transform its denizens into creatures that could live on dry land. So the new forms of life that have appeared on the earth's surface have doubtless been due in part to changes in the cosmic conditions themselves, as well as to the appropriation of new niches and the more efficient occupancy of old niches.

The most suggestive observable illustration of the way a new species establishes itself is afforded by those rather numerous cases when an old species has been,

by man's intervention, transplanted to a favorable, but hitherto unoccupied, habitat. To the average American the most familiar instance is probably that of the English sparrows. A few of these hardy foreigners, introduced into this congenial environment about 1851, after a brief period of special care, proceeded to multiply at such a rate that for a time there appeared an actual danger that they would drive many of our native birds off the face of the earth. Like wild-fire, they spread over the entire country. Then welcome signs began to appear that they were no longer increasing, and now we are informed on good authority that they are actually diminishing in numbers. Their niche is full, and they have to stop. Similar cases are the gypsy moth, the Russian thistle, and the chestnut tree blight in this country, and the rabbits in Australia. In these artificial cases, the increase is much more rapid than in the actual development of a new species in nature, because the new type does not have to compete with closely related types from which it is diverging.

Man a New Species

We are now prepared to consider man as a new species just beginning to force his way into a crowded natural economy. Following the evolutionary interpretation, we may assume that man came into existence by branching off from some earlier form, or forms, from which he differed at first only in minute details. Whether we say "form" or "forms" depends upon whether we accept one or the other of two vigorously supported theories, the theory of "monogenism" and the theory of "polygenism." According to the former of these theories, there

was only one original human stock. Every human being alive today, and all that have intervened between them and the first humans, have descended from a single primitive group, similar in type, detached from the same pre-human stock, and inhabiting the same territory. According to the latter theory, there were two or more primary human groups, deriving from a corresponding number of non-human stocks, and appearing in separate parts of the earth's surface. The great majority of students adhere to the monogenetic interpretation, though there is enough evidence on the other side to swing over some careful investigators.[11] Fortunately, very few of the important conclusions relating to the foundations of social life are materially affected by this decision, one way or the other. For our purposes it is sufficient to assume the accuracy of the monogenetic interpretation, holding subject to revision any arguments that depend directly upon it.

Pre-Human Ancestry

As to the exact nature of this pre-human stock from which man branched off we *know* nothing positively. Our opinion rests upon certain indications and implications. These, however, as has been pointed out, are sufficiently definite to afford a high degree of assurance. First of all, there is not the slightest evidence whatever that man is "descended from a monkey." The stream of life from which the monkeys have come probably separated from that out of which man has come long before man himself appeared. Nor is it to be supposed that man is descended from any of the present forms of ape, and not necessarily from any form that

would be classified as an ape if it existed today. It was presumably an *ape-like* form, but then it was also a *man-like* form. There are at present four species of anthropoid apes, the Gorilla, the Chimpanzee, the Orang-Utan, and the Gibbon. These may all very likely have descended from the same original stock as man, and according to the conception explained on page 32 they may be more closely related to man than either they or he are to any other living form. But it is not supposed that any members of this common pre-ape, pre-human stock survive today. In accordance with the processes already described they have been evolved out of existence. The "missing link" is not a link between man and the apes, but between man and the most recent form of organism reasonably presumed to be in his direct line of descent. There are, in point of fact, many missing links. Pithecanthropus Erectus has filled only one gap.

In the second place, we are justified in supposing that this immediate pre-human form was considerably inferior in intelligence to even the lowest types of present-day man, and perhaps inferior to any of the great apes. If, as we are assuming, man separated himself from this stock by a gradual process, he must himself have had very humble endowments in the beginning. It would have been very difficult indeed, if you and I had been there to observe, to fix upon any particular stage in the development at which we could say that humanity had come into existence. Gradual processes do not lend themselves to sharp lines of demarcation.

There must have been a period of immense duration during which the changes were so slight that if it were conceded that the creature was human at the end of the period it would be difficult to demonstrate that it was not human at the beginning of the period, and *vice versa*. In the end, however, certain unique traits became so clearly marked that there could no longer be any doubt that a new species had come into existence.

As to what the precise traits were that first differentiated man from his next of kin we have no exact knowledge, and it is likely that we shall never know in detail. We are forced to judge by those characters, which, in the long course of development, have proved to be most distinctly human. Of these, two or three stand out preëminent. The first is a peculiarly competent and flexible brain, capable of an unprecedented degree of adaptation and development. The second is an "opposable thumb," that is, a thumb the tip of which can be placed squarely against the tips of the fingers. This may not have been an exclusively human trait, as the higher apes have something that approaches it today. It alone could never have set man forward on his unique pathway of achievement. But neither could the brain alone. Without the delicate manipulations made possible by his efficient hand very few of man's economic or artistic accomplishments could ever have been realized. A third trait was a tendency toward an erect posture. Doubtless there were other correlated variations that helped to give man the advantages that enabled him first to crowd his way into the arena of

life, and eventually to dominate it. The important thing for us in the present connection is that he did both of these things.

Span of Human Development

Consider, then, the termini of the great span of human existence. At one end is a small group of creatures now quite definitely differentiated from any other living types, but nevertheless displaying a mode of existence not so far removed from that of other high forms. Their springs of conduct were still almost completely instinctive, they were almost completely dependent for their livelihood upon the supplies furnished by nature ready to hand, and they were of necessity closely adapted to one, and only one, physical environment. In physical appearance they were much more like a chimpanzee than a modern man. Their bodies were covered with a thick growth of hair, their arms were relatively long and strong and their legs short and weak, their posture was stooping. The head was set well forward on a powerful pair of shoulders and a thick, short neck. The forehead was receding, the eyes deep-set, the nose flat, the teeth prominent and strong, the cheek-bones high, the lower jaw powerful but with a receding chin. Their time and energy were consumed by a very few dominant activities, first of all self-maintenance and reproduction, and then a certain amount of play and investigation, the latter being hardly more than simple "monkeying." There was neither time nor capacity for the higher forms of activity associated with modern man.

One's imagination draws a vivid picture of such a creature, sitting patiently hour after hour at the mouth

of a rabbit burrow in the hope of capturing the occupant when it came out, devouring with fierce gusto the mangled remains of a deer left by some satiated sabre-toothed tiger, dancing with joy when the discovery of a bee-tree offered promise of some variety to his unpalatable diet, and shivering miserably at night on the lee side of a boulder which partially sheltered him from the storm.

At the other end of the great span is the man of today, with a splendidly erect, well-poised body, beautiful in form and proportions, and with a head and face symmetrically shaped and delicately modeled, and infinite in variety of detail and expression. Greater still, however, are the changes in the brain and the products of the brain. Man now stands as the master of nature in innumerable particulars, wielding, manipulating, and directing the forces of nature to serve his own ends. Foresight, reason, and deliberate choice have supplanted instinct as the main spring of his behavior. He is surrounded by an incredibly complex creation of material devices and social institutions by which he has freed himself from complete subjection to the elementary needs of his being, and has provided the means for the cultivation and gratification of his higher appetites and cravings which have grown along with the possibility of satisfying them.

Continuous Increase

Most wonderful of all, did we but realize it, is the fact that man has hitherto escaped the law of stationary population which we have seen to be so imperative in nature. Not only has he succeeded in increasing his numbers steadily during the

whole period of his existence, but he has increased them at a continually accelerating ratio. His most remarkable achievements in this direction have taken place within the latest century or two. The Nineteenth Century stands out unique in this particular. According to the best estimates there were in the world, in the year 1800, altogether about 700,000,000 people. One hundred years later there were, roughly speaking, 1,700,000,000. These figures furnish extraordinary food for thought. If man has reached the point where he not only can, but does, much more than double his numbers in one hundred years, what is the prospect of the future? Putting it in another way, it took the human race about half a million years to produce a total of seven hundred million persons; in the next one hundred years it produced one billion additional.

These are probably the most important figures in the whole range of social statistics. We shall have occasion to revert to them in the future. Our task at present is to inquire by what means a new species of animals, starting upon such a humble footing, has been able for five hundred thousand years or more to escape the imposition of one of nature's most inflexible laws.

Leaving aside all subsidiary details, and reducing the answer to the barest skeleton, we find that it presents two distinct faces. Man has escaped the law of stationary population by the development and application of two fundamental devices—Movement and Economic Culture. These are intimately interdependent and inextricably interwoven, but they can be best comprehended by considering them separately for a time.

Let us return, then, to our original group of human beings, composed presumably of a few hundreds or a few thousands of individuals, living probably somewhere on the high central plateau of Asia, and engaged in the arduous enterprise of forcing their way into an already crowded natural economy. Like every other organic species, they were equipped with a physiological capacity for increase far in excess of the means of subsistence that they could wring from the environment, and with an impulse to mate that drove them to come as near as possible to realizing this capacity. Consequently, as always, their actual increase was conditioned, not by their fecundity, but by their ability to enlarge their appropriations from nature. The first, and simplest way to enlarge their appropriations was to extend their range, in other words, to force themselves as completely as possible into the niche that already existed in their original habitat. The extent to which this could be done depended on the extent of this habitat, that is to say, the total area of land to which these primitive humans were adapted, and in which, accordingly, they could live without any change in type.

Extension of Range

It would be idle to attempt to surmise exactly how large this original habitat was, and exactly how many human individuals could subsist in it. The point is of no particular importance. The important consideration is that man must inevitably and irresistibly have extended his domain over this particular area until it was as full of human beings as it could hold. Any other animal, and in fact any plant, would have done

the same. We do not know how long this process took, but we do know that eventually it came to an end, and when this stage in his career was reached man found himself face to face with the law of stationary population. His habitat was replete. He might hope to maintain his present numbers, but he could not hope to increase them without the addition of some new factor.

For any ordinary species this would have meant the end of increase. It would have settled down into a state of constant numbers, which would have been continued until some environmental change upset the balance of nature. But man was not an ordinary species. He had peculiar endowments that had already set him apart from all other creatures and now, as it proved, enabled him to embark upon a career of world conquest such as no other species has ever achieved. It seems beyond question that one of these endowments was an exceptional variability and flexibility of physical type, that is, capacity for physical adaptation. A new species is likely to have greater variability than an old one, and man appears to have been unusually marked in this respect.

Human Adaptation

A clear comprehension of what presumably took place is essential to an understanding of many phases of human life and development. At the stage we are now discussing, the original human habitat was dotted over fairly evenly with human beings. The great majority of these individuals were living at a greater or less distance from the periphery of the habitat. Surrounded as they were on all sides by others of their kind, they enjoyed no latitude

of existence. For them and their offspring there was no possibility of increase. Only so many of the young of any generation could survive as had places made for them by the death of their elders. But a certain number of individuals were established on the very frontiers of the habitat. They had crowded as far as possible out into the less suitable environments. Life for them was probably harder than for those nearer the interior, but they had one great advantage—they had a chance for the actual increase of their offspring.

This chance rested upon the principle of variation. As has already been observed, no child of any parent is ever exactly identical with the parent, but tends to vary with respect to each of the separate traits of its parent. These variations tend to be on every side of a mean represented by the parental character. In the case of a species well established in the midst of a stable environment, the chances are that this parental mean represents on the whole the best possible adaptation of that species to the environment. All possible variations have been tried out in the previous ancestry of the species, and only the fitter have survived. Consequently, among the offspring of the present generation, practically all variations are disadvantageous, and the more extreme they are, the more disadvantageous. As a result, those individuals possessing the widest variations tend to be eliminated in the competition of life, and those most like the parent tend to survive. Thus the specific type is preserved intact.

But on the edge of the environment there is always the possibility that some of the variations of the off-

spring, while less suited to the original environment, will be better suited to the adjacent environment. Such variations, once they appear, will enable the new member to carry out his existence a little further over the edge of the old habitat than his parent could have done. Being to this extent alone in the field, he will enjoy a favorable situation. He will be able to survive, and to produce offspring of his own. These offspring, as has been shown, will tend to vary on all sides of their own parental type. Some of them will display the particular variation, or combination of variations, that gave their parent his chance, in even more marked form than the parent. They will therefore be able to move a little farther into the new environment, and so the process will be continued.

Selection

The accompanying diagram, (I) in a rough way, illustrates how these changes, according to the Darwinian formula, take place. It applies to a single trait, the significant feature of which is length, for example, a leg, a tail, or a neck. The vertical line (*a*) represents the form of this trait in the parent of the first generation considered. Grouped about this mean in the form of dots are the variations represented by the offspring. Assuming that length is the quality particularly required by the new environment, the individual with the widest variation toward length will be the one who is most able to move into the new environment and survive there. He thereupon establishes a new mean (*b*), about which his offspring will be grouped. Once more, the individual with the widest variation in the direction of length will

be the one to survive and move still further into the new area. Granted sufficient time, and the selective principle working not upon one trait alone but upon the whole complex of traits, it is believed that very wide departures from the original type may thus be produced.

The process thus sketched is by no means exclusive

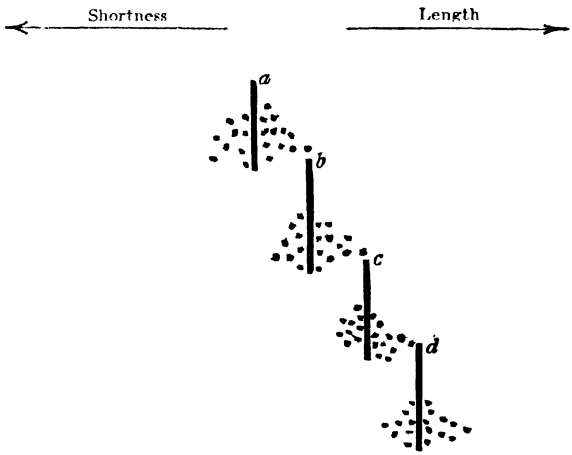

FIG. I.—DIAGRAM REPRESENTING THE SELECTION OF VARIATIONS.

to man. On the contrary, it is exactly the process by which the great types of life have been spread from their original centers more or less widely over the earth. The great difference is that in the case of all other types, at least of the larger forms, this process of variation has resulted in the breaking up of the original type into separate species. The adaptations necessary for survival in the new environments could go only so far

without producing changes so great that specific unity was destroyed and new species appeared. Man alone, it seems, of all the world's creatures has been able to spread himself pretty completely over the entire globe without losing his specific unity.

Specific Unity of Man

The preceding statement assumes that man today is, in fact, still a single species. This assumption is accepted by the great majority of students, though it can hardly be regarded as actually proven. The term "species" is not easy of definition, and the criteria for the distinction of separate species or the determination of specific unity are still somewhat vague and uncertain. The traditional test is the possibility of continuous fertile interbreeding. That is, if two different types can be bred together indefinitely, and the offspring are fertile not only with each other but with either of the original types, then the two types are considered as varieties of the same species. If, on the other hand, the two types are infertile with respect to each other, or if the originals are fertile but the offspring are unfertile, then they are considered to be of separate species. The latter situation is by no means uncommon. There are many related types of plants and animals that can be bred together with a reasonable certainty of offspring, but the product is unfertile. Such offspring constitute the true hybrids. The most familiar example of the hybrid is the mule, the product of the jackass and the mare. This kind of mating has the ordinary productivity, but the product is sterile.

Presumably not every possible mating of different types of mankind has been tried out, but in so far as

they have been they appear to support the complete interfertility of human varieties, and therefore to indicate man's specific unity. These facts constitute one of the greatest arguments in favor of the monogenetic theory of man's origin as contrasted with the polygenetic. It is almost inconceivable that three separate stocks, representing at least different species and probably different genera, should eventually have evolved toward each other to such a remarkable degree as to stand the tests of specific unity, especially in view of the principle that the general trend of evolution is toward greater and greater specialization and differentiation. Among the great majority of anthropologists and ethnologists it is customary to regard the different types of men as the varieties of a single species.

Dispersion

Returning, then, to our original human habitat in central Asia we find man beginning to escape the law of stationary population by squeezing his way into new environments. This progress took place not in one direction alone, but in several. In every case it illustrated one of those fascinating reciprocal processes not at all uncommon in nature. Man could not move except as he adapted. But it was the movement that caused the adaptation, so he could not adapt except as he moved. So he adapted as he moved, and moved as he adapted. Obviously, the process must have been excessively slow. In fact, slowness was one of the outstanding and characteristic features of this primeval form of human movement.

Other features of this early form of movement, to

which we may give the name "dispersion," need also to be noted. The first of these is that it was essentially a movement *away* rather than a movement *to*. In other words, the destination was insignificant, virtually non-existent, the source was everything. It was the irremediable situation in the old habitat, not any allurement in the new one, that caused movement. The direction was not selected because it was desirable, it was determined because it was possible.

Another factor of dispersion is that it was largely unconscious. The people who participated in the great movement of dispersion probably did not realize in the least that they were taking part in a great population movement. This is because the actual ground covered by any particular individual was of very small extent. All that they were conscious of was establishing themselves in a less crowded portion of the forest, the plain, or the valley. Probably the state of their intelligence was such that they were scarcely conscious even of this. It was successive similar acts of innumerable individuals that eventually produced the character of a movement in a definable direction. A somewhat similar phenomenon on a much briefer scale is presented by the history of some of our New England cities. The original settlement was located on the immediate waterfront, and here the best residences in town were built. As the community enlarged, business became established in this district and new residences were built a little further inland. In the course of time the original earliest dwellings were torn down or converted into tenements, while the newest residences of the well-to-do

were built in still more remote sections. Eventually the best residence district is found several miles from the original location. Accordingly we say that there has been a "movement" of the well-to-do population away from the waterfront. Theoretically, this result might have been accomplished even though no single family, having once established itself, had changed its dwelling place.

Being thus unconscious and largely instinctive, dispersion was an unplanned movement. It was not governed by any prearranged scheme or system. Finally, in harmony with the foregoing characteristics, dispersion was a movement in the direction of least resistance. It is helpful to think of it as a movement resulting from pressure, and accordingly extending itself where opposition was least. Or again, this type of population movement has been aptly compared to the flowing of a heavy, viscous liquid. This figure is particularly suggestive because, other things being equal, population tends, in the literal, physical sense, to flow down hill.

The Great Expansion

From its early Asiatic center, then, humanity proceeded to flow in a number of directions into the hitherto humanly unoccupied portions of the earth's surface. The constant force back of this movement was the steady, incessant tendency to multiply in all the existing groups of men. As a result, all the fundamental progressions were one-way movements; there was no significant return current. This was for two main reasons. First, since the movement was a reaction to pressure, and since there was no diminution of the pressure, any backward flow would

have been contrary to the laws of force. Second, the obstacles overcome in the struggle for the means of subsistence were often so nearly insuperable that no lesser incentive would induce the adventurers or their descendants to encounter them again. Furthermore, to the extent that movement rested on physical adaptation, a return movement would have required re-adaptation, something not impossible, probably, but certainly not easy of achievement.

It need hardly be said that in all this discussion the situation is being reduced to the simplest possible terms, far simpler, probably, than actually prevailed. This is in the effort to make the underlying principles, and the basic processes, stand out clearly. It is merely an attempt to set forth the scheme, in its most convincing aspects, whereby a little group of newly evolved animals eventually peopled the earth. In a general way, the phenomena described probably persisted along the ever-extending frontiers of human habitation for countless ages of time. In the meantime, however, quite diverse phenomena must have been emerging in the older regions of habitation. Entirely different forms of population movement were developing; changes were taking place in the relation of the human individual to his environment; man himself was evolving, and all human relations and activities were altering correspondingly. Dispersion is a form of movement that could transpire only at certain stages of man's development, and only under certain aspects of the earth-life bond.

One thing, at least, is certain—eventually humanity spread itself over the entire habitable globe, until every

crevice and cranny of its potential niche was filled. Unless the theory of polygenism is adopted, it would seem that this result can have been achieved only by a series of continuous, unbroken progressions from an original center. It is impossible to conceive of any great leaps either in geographical location or in human types.

Another thing, almost equally certain, is that when the process of land appropriation was completed the earth was found to be inhabited by groups of human beings, no longer homogeneous in character but differing widely from each other in physical type as well as in social forms and institutions. These physical differentiations, their nature and their origin, now demand our attention.

Race Formation

The simplest commonplace of anthropology, or of geography as commonly taught, is that the human species is divided up into a number of groups differing from each other markedly in their bodily characters. To these groups we habitually give the name of races. This term is bandied about in every-day conversation, as well as in presumably learned discussions, as though its meaning were not only clear and well-defined, but also identical in the minds of all hearers or speakers. In point of fact, there is scarcely any term in similar use that is subject to more abuse, confusion, and misconception. One of the most indispensable of the foundations of social life is a correct comprehension of the nature and meaning of race.

The schematic account of the spread of mankind over the earth's surface has already given us the key

to the understanding of race. Race is the product of the diversification of an original life stock, by a process of continuous branching, into a number of separate bodies. The essence of race is kinship, that is, community of ancestry. The closer the kinship the stronger are the bonds of race; the more remote the kinship, the more distant are the racial affiliations. As such, race is clearly a quality of plants and animals as well as of man, and is correctly so used.

The familiar comparison of the "family tree" furnishes a very useful analogy. The races of man are, in a very real sense, the branches of the human family tree. If we start with the original human group as the trunk of the tree, the first separation into great limbs represents the original diversification of the parent stock as it flowed out in different directions into new regions. These first divisions were, as a result of physical factors of topography, climate, etc., and in some cases by the interposition of the main stock between them, isolated from each other. Thus, though deriving from the same original source, they became disconnected in their future development during long periods of time. Eventually each of these primary branches projected itself into one or another of the great habitation areas of the world. In doing so it necessarily underwent a modification of type by means of the progressive adaptations required for life in the new environment. In a very real sense, then, the races of man have been created by the different environments into which the great human stock has extended itself. The different physical characters of the races as we

know them represent the qualities peculiarly suited to the requirements of the physical environments in which they first established themselves. Such a region is called the "area of characterization" of the race in question. There are, in the most general sense, three primary, and two secondary, areas of this kind—Asia north of the Himalayas, Africa, Europe, America, and Oceania including south-eastern Asia. Correspondingly, there are, according to one classification three primary races, the Mongols, the Negroes, and the Caucasians, or, according to another, five—the Amerinds (American Indians) and Malays being added. Each has its characteristic skin color, Yellow, Black, White, Red, and Brown.

Racial Adaptation

Now it would be exceedingly interesting, if it were possible, to trace in detail the connection between each of the distinctive features of each of the basic races, and the requirements of its respective area of characterization. Unfortunately this has never been done, and it is by no means certain that it can be done. Only a few of the simplest adaptations may be regarded as definitely established. Thus it seems clear beyond any reasonable doubt the the heavily pigmented skin of the negro, and the dark iris of his eye, are useful protections against the intense light of the tropics, while the florid skin and blue eye of the Scandinavian are better adapted to the more diffused light of his native home. It has also been suggested that the kinky hair of the negro, providing numerous little air pockets, affords an effective insulation against the extreme heat of the sun beating down upon

him.[12] But why the Mongol has slanting eyes, high cheek bones, and wiry black hair, why the Mediterraneans and Nordics are long-headed and the Alpines short-headed, and why the American Indian has a coppery skin, no one has told us.

The explanation of race formation that has just been given, therefore, remains still in the stage of a hypothesis; it has not been definitely proven. But it is a very reasonable and convincing hypothesis. It is, in fact, not only the best explanation, but virtually the only explanation, we have of the physical diversity of human groups. As such, we can do no better than to hold on to it until the time, if ever, that something more convincing is offered.

The process of race formation, then, may be thought of as closely associated with the process of dispersion.

Meaning of Race

The two are different aspects of the same great phenomenon. As long as early man continued to move into new environments, he continued to make modifications in his type. As long as these sub-groups remained in isolation, segregated from each other, their distinctive features would tend to be preserved and accentuated. Thus the first main division of the human trunk by no means represents the end of race formation. The various limbs have continued to divide and subdivide, into ever smaller and smaller groups, with ever closer kinship within the group, and less and less significant differences between it and the most closely related group. Indeed, the process of race formation does not cease until we reach a group composed of full brothers and sisters, with ex-

actly identical ancestry. Long before this extreme of subdivision has been reached, however, we have ceased to call the kin-groups races. There is no exact agreement, in fact, among authorities as to how far the term race should be extended to cover more and more minute divisions of the human stock. For example, we commonly speak of the entire species of mankind as a race —the "human race." Equally familiar is the primary subdivision into five (more or less) main races already alluded to. But we also refer to the sub-divisions of one of these basic groups as races. Thus, for instance, the white race in Europe is divided into the Mediterranean, Alpine, and Nordic "races." Finally, the term race is used to designate even the next sub-division, as the Libyan, Iberian, Ligurian, and Pelasgian "races" into which the Mediterranean race is divided. This is about as far as we customarily go. But it should be clear that we stop here not because of any different principle governing the further sub-divisions, but merely for convenience, and because more minute differentiations tend to become insignificant.

Race, then, is exclusively a biological factor. It is purely a matter of heredity. This is one of many reasons why a correct conception of the nature of heredity is an essential stone in the foundations of social life. There is no better place than this to take this matter under consideration.

CHAPTER IV

THE WAYS OF HEREDITY

EVERY one recognizes heredity, in a general way, as the passing on of the life stream from one generation to the next. To this extent the popular conception is accurate. But as to the details of the process there is a vast amount of ignorance, and many misconceptions. Some of the latter are due to, or at least connected with, the unfortunate use of certain words in the conventional references to the subject. One of these is "blood"—heredity is spoken of as being a matter of blood. In point of fact not a single drop of blood passes from parent to child, and blood has no more to do with inheritance than brains, muscle, or lungs. Another such word is "birth." It is usual to say that heredity determines what you are at birth. This is not only misleading, but to a very large extent untrue. The influence of heredity is determined long before birth. In point of fact, it is determined at the moment of conception. When conception has taken place, heredity has done all it can do; any new factors introduced after that moment, whether before or after birth, are matters of environment. Indeed, as Dr. Saleeby has pointed out,[13] the significance of birth is customarily much exaggerated. Birth is, after all, only an incident in the career of an individual, a very vital

incident, to be sure, but by no means deserving the importance attached to it. In essence, it is nothing more than a change of environment. The change is indeed a drastic one, but as far as the individual is concerned he is essentially the same before birth as after, and entirely the same with respect to his innate characteristics.

To understand heredity, then, it is necessary to consider the factors that exist before conception, and to understand the meaning of conception itself. The simplest way to achieve these ends is to go back to the idea of the cell, which has already been alluded to. As stated in that connection, cellular structure is characteristic of all living organisms. We now need to observe that the cells that make up all organisms except the very lowest (which we may ignore in our present quest) are grouped into two distinct types. The first of these, known as the somatoplasm, includes all the cells that go to make up the body itself as we ordinarily think of it—the flesh, vital organs, skin, bones, blood, etc. Each cell is a living organism by itself, having a life cycle of its own. As such, they have the power of multiplication. They are worn out, or are destroyed, and die. These losses must be made up by the multiplication of the living cells of each particular type. During the stage of bodily growth, additional cells must also be produced. The body, therefore, may be thought of as a colony of associated organisms, of many different types but all related in kind, which maintains itself by the incessant life processes of the individual units.

Somatoplasm

Within this self-maintaining body there is carried a

distinct group of cells known as the germ plasm. These are the ones that are directly concerned with heredity, and an (at least partially) adequate conception of their nature and functions is one of the outstanding achievements of modern science. Leaving aside, for the present, the body plasm, let us consider the significant features and behavior of this germ plasm.

Germ Plasm

In the first place it should be observed that the germ plasm, while carried in the body, is not really a part of the body at all. It is stored in the reproductive organs, and the relation of the body to it is almost literally that of host or carrier. To understand the further distinctive features of the germ plasm it is necessary to examine its composition and make-up in some detail.

Like all other cells, the germ cell is composed of two main portions, the nucleus and the surrounding cytosome. For our present purposes we may ignore the cytosome, and treat the cell as if it were composed of nucleus alone. Under the microscope, the nucleus of the germ cell is seen to contain a number of small, separate bodies, like tiny threads. These have the quality of taking certain dyes while the rest of the nucleus remains clear, and so have been named "chromosomes" (color bodies)—a very inconsequential and trivial basis, it would seem, for christening such marvellous and important particles of matter. The number of chromosomes is fixed for each species of organism, but differs among the various species. In the cells of the human being it is 48. These

Germ Cell

chromosomes are arranged in pairs, that is, there are two of each type of chromosome, the meaning of "type" to be explained later. To illustrate this point we may adopt a simple little diagram (II) which may prove very useful. The circle represents the nucleus of the germ cell. Within it are pairs of chromosomes, for convenience reduced to four pairs (eight chromo-

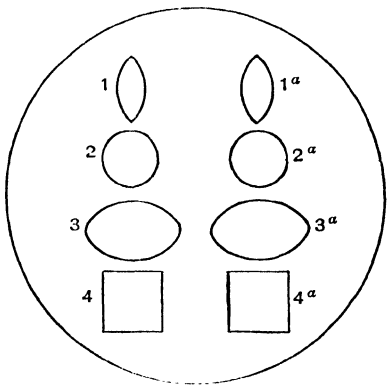

FIG. II.—DIAGRAM REPRESENTING NUCLEUS OF GERM CELL AND CHROMOSOMES.

somes) in the illustration. To indicate that these chromosomes are of different types, each pair has been given in the diagram a shape of its own; but it should be clearly understood that this is merely a graphic device, and that this distinction is not always evident under the microscope. The fact of arrangement in pairs is established more by the way the chromosomes behave than by the way they look.

The germ cells, like other cells, are living organisms

Multiplication Division

and must be able to provide for their own multiplication. This they do by means of a process of division, which, to distinguish it from a second kind of division peculiar to germ plasm alone, is called the "multiplication division." When a cell goes through this process the result is two daughter cells, virtually identical with the parent cell which no longer exists. In order that this identity between

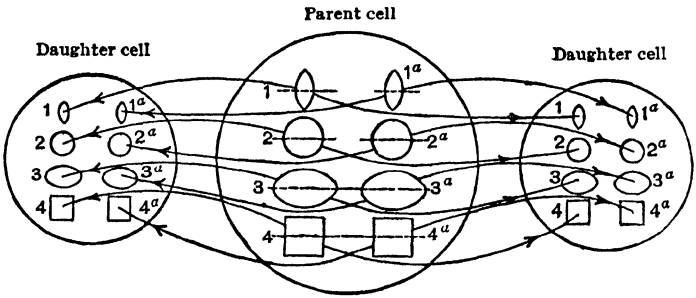

FIG. III.—DIAGRAM ILLUSTRATING MULTIPLICATION DIVISION OF GERM CELLS.

parent and offspring may be preserved, and the character of the cells unaltered, it is necessary that the chromosomes in the daughter cells be exactly similar to those in the parent cell. To accomplish this nature has provided that at the multiplication division each of the chromosomes should divide into two exactly similar halves, one half of each chromosome going to each of the daughter cells, where it develops into a complete chromosome. Thus in the daughter cells, the chromosomes are still arranged in pairs, and each pair is precisely like the corresponding pair in the parent cell.

In a rough way, this process is illustrated in the accompanying diagram (III). It is obvious that this multiplication division may be repeated indefinitely without any change whatsoever in the character of the germ plasm. Thus the reproductive organs of the human body are the "habitat" of a unique colony of living cells.

Maturation Division

But, as already hinted, the cells of the germ plasm have a potentiality not shared by the somatoplasm, the capacity to initiate the existence of a new individual of the species that acts as their host. A preparatory step in this process consists in a unique form of cell division already referred to. This is called the "maturation division" because at this stage the cell matures or "ripens." * In the maturation division the chromosomes, instead of splitting into halves, remain intact but separate from each other, the pair being definitely broken up. The whole of one chromosome of each pair goes to one daughter cell, and the whole of the other to the other daughter cell. As a result, after the maturation division has been completed the chromosomes in the daughter cells (gametes) have been reduced in number by half; they are no longer arranged in pairs. There is only one chromosome of each pair in each gamete. (See diagram IV.) This type of cell in the human being has

* In point of fact the process of maturation is much more complicated than is indicated here. In the female cell half of the cell material turns into polar bodies which can not take part in reproduction. But the outcome from the point of view of the *chances of heredity*, which is what interests us in the present discussion, is essentially as described.

no capacity for further multiplication division. Its only future consists in *combination* with another similar cell. If this combination does not take place it soon passes out of existence.

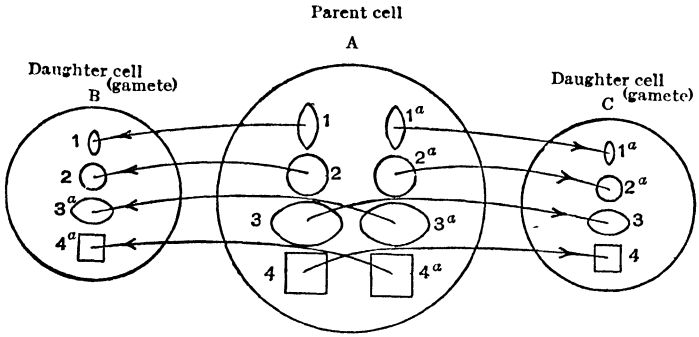

FIG. IV.—DIAGRAM ILLUSTRATING MATURATION DIVISION OF GERM CELLS. This diagram is intended to illustrate the method of distribution of the chromosomes at maturation. One chromosome *of each type* goes to each gamete. This particular sketch, however, illustrates only one of several possible ways in which the chromosomes might be distributed between the gametes. If there were only one pair of chromosomes there could only be two sets of gametes. Chromosome No. 1 would go to one gamete, and chromosome No. 1*a* to the other. If there were two pairs of chromosomes, the possible number of types of gametes would be four, viz., 1 + 2, 1 + 2*a*, 1*a* + 2, 1*a* + 2*a*. If there are four pairs, as illustrated, the possible number of types of gametes is sixteen. The number in the human cell with its 24 pairs is about 20,000,000. Any actual maturation of an egg produces only one gamete which may be any one of the total number of types made possible by the number of chromosomes in the cell. Which one it shall be appears to be a matter of chance.

Fertilization

In the gamete the potentialities of heredity come to a focus. Here is a tiny body of matter in which are contained half of the factors out of which is to arise the entire set of inherited qualities which are to characterize the individual

who owes his existence to it. The other half of these factors are contained in the similar cell with which it is destined to combine. This cell must come from a host of the opposite sex. The gametes in the male sex are called "spermatazoa" (singular "spermatazoon") or "sperm," those in the female sex eggs or "ova" (singular "ovum"). The act of combining a sperm with an ovum is conception, impregnation, or fertilization.

When fertilization takes place the spermatazoon penetrates the envelope of the ovum which (ordinarily) immediately hardens so as to make the entrance of any further spermatazoa impossible. Thus the nuclei of two cells from the bodies of two different individuals are now contained within a single envelope. They forthwith proceed to combine and form a new nucleus, virtually a new cell, the zygote. This cell now constitutes the "embryo," or new individual, and by its process of development gradually assumes the adult character of the species in question.

In the newly formed embryonic cell, therefore, the chromosomes are once more arranged in pairs and the original total number is restored. This makes evident one of the functions of the maturation division. If the number of chromosomes were not halved before fertilization the new cell would have double the number of the previous generation, and the next generation double that number, and so on. One of each pair of chromosomes has come from the father, the other from the mother. To indicate this difference in source, in the accompanying diagrams (V, VI), the chromosomes

in the male gamete are shaded, those in the female are left clear. What is inherited, therefore, is really chromosomes, or, in the words of Professor Jennings, little packets of diverse chemicals.[14]

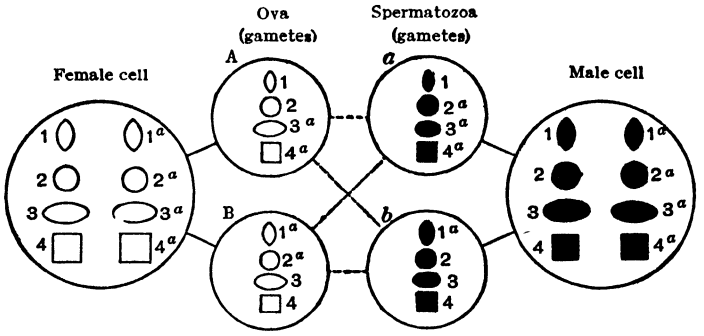

FIG. V.—DIAGRAM ILLUSTRATING FERTILIZATION.

At maturation each cell divides its chromosomes, actually or potentially, between two types of gametes. For each parent, therefore, each maturation presents a two-fold chance of heredity, *with reference to each chromosome;* the one may be taken and the other left, or the other taken and the one left. Fertilization, involving two parents, produces a four-fold chance. In forming the zygote, for each possible maturation there are the following possibilities:

A may meet *a*
A may meet *b*
B may meet *a*
B may meet *b*

Each *chromosome* from each parent has one chance in two of entering into the zygote. But as there are four possible pairs of each type of chromosome, the chance of any particular *pair* being formed is one in four.

Genes

But this is only the beginning of the story. Hereditary qualities do not spring from the chromosomes as such. They are themselves only carriers. The chromosomes consist of much smaller and much more numerous particles of

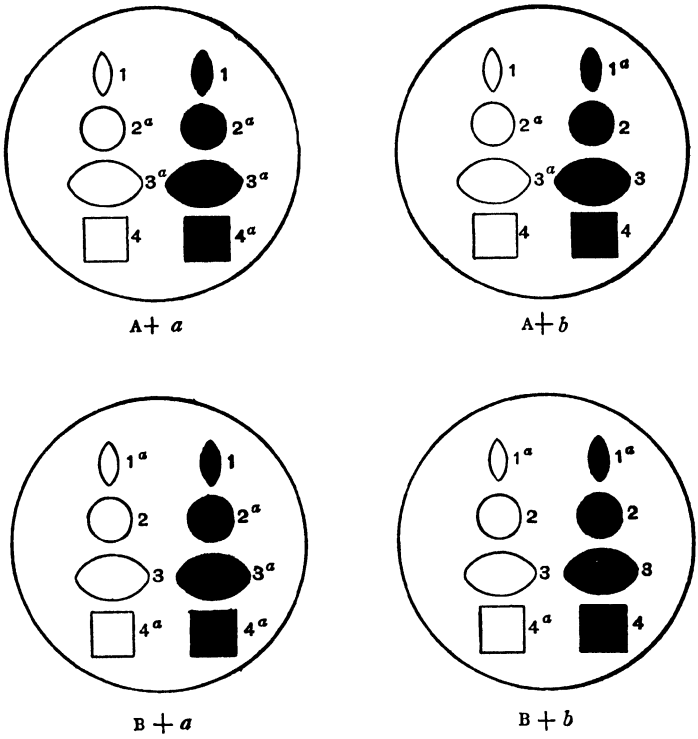

FIG. VI.—DIAGRAM ILLUSTRATING THE ZYGOTE.

The figures above represent the four possible zygotes that might be formed from the two maturations represented in Diagram V. Only one of them, of course, can result from any one fertilization. Which one it shall be is apparently wholly a matter of chance. When it is remembered how many different results are possible from the maturation of any one cell (see Diagram IV), and that the human cell has forty-eight chromosomes instead of eight, some glimpse is gained of the immense variety of children that are possible from any one couple of parents. This diagram also illustrates the fundamental difference in kind between the two chromosomes of the same type—one has always come from the father and the other from the mother. This is indicated by their arrangement on the right or left side of the circle in previous diagrams.

matter known as the "determiners" or "genes." These are the real bearers of heredity. They are too small to be seen by the most powerful microscope, and their nature, still in the hypothetical stage, has not yet been conclusively established. For our purposes, however, their behavior is sufficiently well understood to furnish the needed guides for social engineering. The more refined details of theory are matters of biology, not of sociology.

The composition of the germ cell may be better comprehended, perhaps, by the use of a homely figure, only accurate up to a certain point, but suggestive as to the relations between the different features of the cell. Think of the cell, if you will, as a quart measure. Within this measure are forty-eight pill-boxes, two of each type. For purposes of illustration, type may be represented by color—two red pill-boxes, two blue ones, two green ones, and so on. Within these pill-boxes are a vast number of seeds. Each of these seeds has the capacity to produce one of a certain type of plant. Each type of seed belongs in a certain color of pill-box. Thus, for example, we may say that the seeds of apple trees belong in the red boxes, seeds of cherry trees in the green boxes, seeds of roses in the yellow boxes, and so on. There can be only one seed of a given type in any one box, and each box of a given type may have one seed of each of the types that belong in it. Thus there can not be more than two seeds of apple trees, one in each red box. But within each *type* there are possibilities of innumerable different variations. There are many different kinds of apple trees, many different

kinds of cherry trees, many varieties of roses. Any one quart measure, having only two red boxes, can have at most the seeds of only two kinds of apple trees. They may be both of the same varieties—both Baldwins, for instance,—or they may be of different varieties—one a Baldwin and one a Northern Spy, one a Greening and one a Russet, throughout all possible combinations. Furthermore, seeds of the same variety may have different origins. One Baldwin seed may come from Vermont, one from Oregon, etc. Each seed, however, must produce the kind of plant it belongs to.

The quart measure is the germ cell. The pill-boxes are the chromosomes. The seeds are the genes. The plants are the traits of the body plasm that grow out of or are determined by the genes—that is why they were formerly called determiners. To carry the figure one step further, then, the human body may be likened to a great garden, composed of a vast number of plants. The plants correspond to the separate hereditary traits of the body, which are known as "unit characters." Each unit character owes its existence to a gene of a certain type, as each plant owes its existence to a seed of a certain type. The genes can not combine or blend any more than the seeds can combine or blend. The human body, accordingly, with all its seeming unity and harmony, is really a mosaic of unit characters, as the most beautifully planned garden is a mosaic of individual plants. Finally, even though the genes of a given unit character are as nearly identical as possible, they have different origins,—one comes from the

mother and one from the father. There are as many different origins for genes of a given type as there are people in the world whose germ plasm contains that type of gene.

Now, as has been explained, when the maturation division takes place, the pill-boxes of a given color separate from each other. The gamete has only one red box, one green one, one yellow one, and so on. Consequently, in each gamete there can be only one gene of a given type. Between genes of the same type there are great differencs in potentiality. One gene may completely overmaster another gene of the same type, so that the bodily trait associated with the latter may not actually appear at all. In such a case the strong trait is said to be "dominant" and the weak trait "recessive." Thus if in one chromosome of a pair there is a strong gene and in the other chromosome a weak gene, the weak gene will produce no effect upon the bodily characters at all, as a piece of clear glass held over a piece of red glass makes no alteration in the appearance of an object seen through the two.

Dominance

Or, to revert to our other figure, the situation is somewhat similar to what it would be if, when a Baldwin seed and a Greening seed were planted side by side, the Baldwin seed completely overpowered the other so that it could not grow into a plant at all. Of course it is quite possible that each of the chromosomes in a pair may contain the same kind of gene of a given type, so that there are two strong ones or two weak ones. In such a case the trait is said to be present in "duplex" form; if there is only one gene the trait is said to be

"simplex." In some cases, a duplex trait appears more strongly developed in the body plasm than the corresponding simplex trait, as a glass of water is more deeply colored if two spoonfuls of ink are thrown in than if only one is added. In other cases, the body plasm gives no evidence as to whether the trait is simplex or duplex, as you can get the same explosion from a keg of gunpowder with one lighted match as with two. Eye color in human beings appears to be an example of the former situation. The blue eye is the recessive trait; the brown, hazel, or gray eye is the simplex form of the corresponding dominant trait; the black eye is the duplex trait. Fur color in guinea pigs is an example of the latter case. White, for example, may be the recessive trait, black the dominant. A guinea pig is just as black with one black gene as with two.

Chances of Heredity

What is actually inherited, therefore, is a group of genes. With reference to any one type of genes, if there is a dominant and a recessive form, each one of which may be present singly or doubly in the germ cell of each of a pair of parents, there are six possible combinations that may result in the offspring. Indicating the dominant gene by + and the recessive by —, the following diagram illustrates these possibilities:

A	B
++	++
——	——
++	——
+—	++
+—	——
+—	+—

The outcome of the mating of these two parents, that is to say, the character of the offspring, depends upon how these six possibilities work out. There is, as we have seen, a large element of chance in heredity. In the human female ordinarily only one ovum matures at a time, so that at that time the possibilities are limited. But over the entire period of fertility the ova may differ from each other within very wide bounds. In the case of the males, on the other hand, there is a large number of mature cells in existence at any time, and so the possibilities of varied combinations are much increased. The actual outcome, so far as we know, corresponds closely to the law of probabilities. Thus in the case of a single type of gene the probabilities are as follows:

If + + meets + + the offspring will all be + + (certainty).
If — — meets — — the offspring will all be — — (certainty).
If + + meets — — the offspring will all be + — (certainty).
If + — meets + + the offspring will be ½ + + and ½ + — (chance).
If + — meets — — the offspring will be ½ + — and ½ — — (chance).

In the two last instances, in other words, the ratios in the offspring will appear only if the offspring are numerous enough to give the law of chance an opportunity to prevail. This means a rather large number, as you can easily verify for yourself by tossing pen-

nies—possibly you already have. If one parent is of the + — type, there will be in his germ plasm two sorts of mature cells. One sort will have the dominant gene, the other the recessive gene. If the number of offspring is small it may easily happen that the fer-

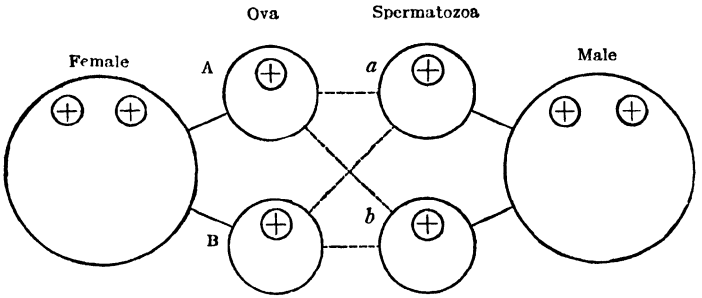

FIG. VII.—DIAGRAM ILLUSTRATING THE CHANCES OF INHERITANCE OF A GIVEN GENE.

The diagram above suggests a convenient method of figuring out the chances of inheritance of a given gene when the constitution of the germ plasm is known. This particular sketch corresponds to the first of the possibilities listed in the table on page 99. Obviously, in this case, whatever the combination may be that takes place, the trait will have to be dominant-duplex in the offspring. In a similar manner the probabilities may easily be charted for each of the other possible combinations. Only the chromosome which may contain the gene in question need be regarded.

tilizations will all take place from one sort of cell. Regularity of the ratios is observable among individuals only in species where the fecundity is high, as in plants, or in such animals as rats, guinea pigs, etc. In human beings, it is observable only among masses of individuals. A method of visualizing these probabilities is suggested in Diagram VII.

There remains the sixth possible situation:

If + — meets + — the offspring will be ¼ + +, ¼ — —, and ½ + —. This is the famous Mendelian ratio, and its operation may be illustrated by the accompanying diagram (VIII):

Mendelian Ratio

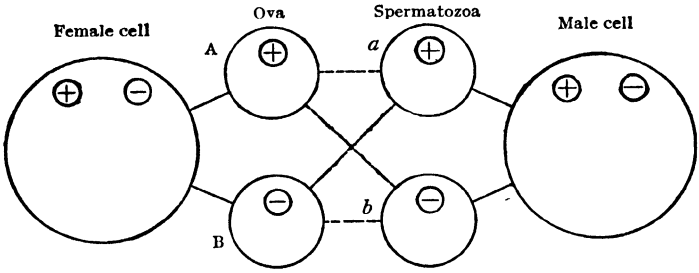

FIG. VIII.—DIAGRAM ILLUSTRATING MENDELIAN RATIO.
Only the chromosomes which may carry the gene in question are represented.

If A meets *a* the result is + +
If A meets *b* the result is + —
If B meets *a* the result is + —
If B meets *b* the result is — —

The way it works out may be illustrated by the case of a certain species of flower that has two distinct varieties, a red and a white,—each of which breeds true and shows no marked variation. Redness is a dominant trait requiring the duplex form for full development, whiteness is a recessive trait. The first inter-breeding of these two varieties, accordingly, will follow the + + with — — formula—all of the offspring will be of the + — type, in this case pink or mottled. If the members of this generation—let us say the pink flowers—are bred with the red flowers they follow the + + with + — formula; half are red and half are pink. If they are bred with the white variety they follow the — — with + — formula; half are white and half are

pink. But if they are bred with each other, one quarter of the offspring are red and will breed true to the red variety indefinitely, one quarter are white and will breed true, and one half are pink and follow the same formulas as their parents.

The foregoing illustration, as stated, rests upon the assumption that the character in question is of the type where two genes are required for its full development. If a single gene suffices to produce the trait in its complete aspect in the body plasm, the results are more complicated and much more surprising until the Mendelian formula is understood. Suppose we have a species of guinea pigs with a black variety and a white variety. But in this case the quality of blackness may be either duplex or simplex, with no sign of the difference in the body plasm. Then the mating of black guinea pigs with white guinea pigs will, in the second generation, produce all black specimens. If this second generation is bred together the offspring will be three quarters black and one quarter pure white. The pure whites will breed true, but the blacks of this generation will breed in accordance with a formula based on the ratio of one-third of the $+ +$ type and two-thirds of the $+ -$ type. Thus if they are bred with pure-blacks, two-thirds of the offspring will be pure black, and one-third hybrid black—that is, of the $+ -$ type.

Dangers of Inbreeding

If the recessive quality is an undesirable quality (not necessarily true any more than the positive), very serious problems arise from the fact that it is impossible to tell from the body plasm whether the germ plasm is sound or not. As far as the individual himself is concerned, it apparently

makes no difference whether the trait is simplex or duplex. But it makes a great deal of difference with respect to his offspring. A case in point among human beings is albinism. The undesirable trait is the recessive trait, but normality in the body plasm may be produced by one gene as well as by two. Consequently, two parents who are both defective in their body plasm can not produce a normal child; but two parents whose body plasm appears sound, but who come from defective stock, are likely to produce defective offspring. Out of a large number of such matings, the proportion of children who display albinism in their body plasm will be about one in four, while about half will be like their parents, liable to produce defectives. The remaining one-fourth will be sound in body plasm and germ plasm alike. As already explained, any given pair of parents run the *risk* of having all their children defective. There is much evidence that certain forms of hereditary feeble-mindedness tend to follow this formula.

If there exist all these possibilities with reference to *a single unit character,* it is not difficult to realize that in a species with as many unit characters as man the number of possible combinations from any two parents is very great, and for the whole of mankind may practically be expressed by infinity. One question, however, has very likely arisen in your mind by this time. If the genes are carried in the chromosomes, and if the chromosomes are transmitted in their entirety, why are not the genes inherited in blocks, and why are not the possible combinations deter-

Unlimited Variety

mined by the number of chromosomes rather than by the number of genes? In short, why do we have to bother with genes at all? The answer to this question is furnished by a further remarkable feature of the germ plasm. At one stage in the development of the germ cell, before the maturation division, the dividing walls between the chromosomes break down—as if the covers of the pill-boxes all came off—and the genes are free to mingle with each other. Eventually they have to go back to the chromosomes again and be shut up. They have to go back to a chromosome of the same type as before, but they do not have to go to the same one of the pair, just so long as only one gene of a given type gets into one chromosome. Thus, for example, if the red pill-boxes each contain one hundred seeds, after this process takes place each hundred seeds may be restored to the same box they were in before, or there may be ninety-nine from the same box, and one from the other, or ninety-eight from the same and two from the other, or any one of the other possible mathematical combinations.* Thus, for all practical purposes, the chances of inheritance are almost the same as if the genes were transmitted independently.

There remains to be considered one peculiar type of chromosome known as the sex chromosome, or X chromosome. In the human species this occurs doubly in the germ plasm of the female, that is, there is a pair of X chromosomes. In the male it occurs singly, the other member of the pair

Sex

*Though there seems to be a certain group association among the genes.

being known as the Y chromosome. Within the X chromosome is the gene or group of genes that acts as the determiner of sex. In the female, accordingly, there are two sex genes and in the male one. Thus is a very real sense femaleness may be regarded as a duplex trait and maleness as a simplex trait. (To inquire whether this has any connection with the alleged duplicity of the female and simplicity of the male, would probably be beside the mark.) The X chromosome carries many other genes beside the sex gene, which produce in the body what are known as the "sex-associated traits." These are not necessarily sexual at all in the ordinary use of the word, such as a certain form of color blindness.

It would seem, accordingly, that sex ought to follow the formula of the mating of $+ +$ with $+ -$; the offspring ought to be evenly divided between the two types. For some reason or other, as yet not explained, this does not work out in real life as exactly as would be expected. We have seen that the law of probabilities does not hold except in a large body of instances. So there is nothing surprising in the familiar fact that in particular families the ratio of boys to girls may vary between the two extremes of all boys or all girls. But when we consider a whole society, or all humanity, it would seem that the proportions ought to be almost exactly fifty-fifty, with a wholly negligible variation on one side or the other. In point of fact, however, there is universally a preponderance of male births over female in the ratio of about 105 to 100. Some time somebody will hit upon the explanation, and it may

prove to be a very simple one. At any rate, this provision of nature works out very well from the social point of view as it tends in the long run to preserve the equality in numbers of the sexes. For while more males are born than females, more of them also die. The male death rate is higher than the female all along the line. Even in infancy more boys die than girls, and the discrepancy holds good for almost every specific cause of death. It would seem that females have actually a greater viability than males.

These facts seem to offer very little hope of success to those who seek for methods of predetermining the sex of children. Since sex is determined at the moment of conception, all control over the matter must be exerted on the germ plasm before conception. It would be unscientific and hazardous to deny categorically that this could ever be done, but there appears to be no promise of it in the immediate future.

The great question still remains, from the practical point of view, what, in every-day language, is inherited?

Hereditary Traits

We have seen that genes are inherited, and out of them develop unit characters. But what are these unit characters, and how do they develop? In the first place we must recognize clearly that nothing is inherited which is not in a fundamental sense physiological. Nothing is inherited that does not proceed from certain tiny particles of matter—little packets of chemicals—that are present in the original embryonic cell. As the embryo develops, and the number of cells composing it increases, these cells divide into two distinct groups. One group remains germ

plasm, and continues, by a process of multiplication division, to increase its volume while retaining the identity of each cell with the others, until the full supply of germ cells characteristic of the adult individual is reached. Each of these cells in its complete form (before maturation) is an exact replica of the original, and so the cycle is completed that brings us back to our starting point—an individual as host to a colony of germ cells. This unbroken progression is what is indicated by the familiar term, "continuity of the germ plasm."

While this is going on, however, by some marvellous process, part of the matter of the embryo has ceased to be germ plasm and has become body plasm. What kind of body plasm it shall be is determined, obviously, by what kind of germ plasm it was in the beginning. But a process of differentiation sets up among the cells. The extent of this differentiation depends upon the degree of complexity of organization of the species itself. Certain groups of cells are obviously destined to become arms, others ears, others brain, etc. Eventually every separate hereditary trait emerges in a particular group of cells, each capable of multiplying itself as fast as the wear and tear of the body requires. With reference to many of these traits there is no practical question. We know that our members and organs themselves are inherited. We feel sure that the color of our hair and eyes is inherited. We commonly speak of getting certain distinctive features—a Roman nose, a pointed chin, a Cupid's-bow mouth—from one or another of our parents or other ancestors. But when we come to the detailed aspects or *quality* of these

members, organs, or features we are not so sure. One man may have a poor digestion; it is not certain whether he inherited it from his mother or whether it is due to a characteristic family dietary which his mother (who also has a poor digestion) learned in her girlhood from her mother. Another man may have a fine eye for rifle shooting, like his father. This may be inherited from the parent, or it may be due to an early initiation into a sport of which that father was very fond. So with ability in tennis or music, light-fingeredness, or fondness for tripe. There are, in short, innumerable traits that are matters of family transmission that have nothing to do with heredity at all. It is often impossible to identify a given trait as hereditary or nonhereditary; doubtless many are a combination.

The greatest difficulty of all arises, however, in connection with those traits that are not physical in the old-fashioned, narrow sense of the word, but mental, intellectual, dispositional, temperamental, or moral. Here we find biology verging on psychology. For our purposes it is sufficient to postulate, as can be done with complete assurance, that if any of these traits are in fact inherited, they must depend immediately upon certain qualities of the matter of which the body is composed, and this in turn must be derived ultimately from genes that existed in the original zygote. If musical ability, or mathematical talent, or good nature, or an affectionate disposition, or honesty, or greed are in fact conditioned by qualities of gray matter, or nerve tissue, or endrocrine glands, to that extent they are inherited. There are no grounds for denying that it may be a

very large extent. But neither is there adequate reason for assuming that innate physical qualities account for everything.

There still remains one great problem in connection with the theory of heredity—would that a solution might be offered! Where do new traits come from? If they come from new genes, where do the new genes come from? According to the inclusive evolutionary theory all the existing forms of life have been evolved from a single primeval form, unquestionably of the unicellular type. According to the theory of heredity the stream of germ plasm runs back in an unbroken succession to this original form. Then if it be true that genes are passed on unchanged from one generation to another it would seem that this rudimentary type must have contained all the genes of all the traits of all the species and all the individuals that have evolved out of it. If so, why did not all the traits appear? The only possible answer would seem to be that practically all the genes simply neutralized each other. This in itself seems a *reductio ad absurdum*. But worse than this, if we grant that such a situation ever existed, it is impossible to conceive how living matter ever broke away from it. How a sufficient change in the plasmic situation could have taken place to provide for the release of genes to create all the subsequent species baffles the imagination.

Origin of New Traits

It is customary to answer this question by attributing the appearance of new types to novel combinations of genes, which, as we have seen, at the present

time approach infinity. But before there can be combinations, there must be genes, and where did the genes come from? Furthermore, the possibility of new combinations rests absolutely upon *bi-sexual* reproduction. Without two sexes, how could a sufficient change in germ plasm take place to bring about the momentous transition from uni-sexual or asexual reproduction to bi-sexual? Lifting oneself by one's boot-straps is a simple and trivial achievement compared with this. Any other explanation must of necessity involve the appearance of new genes somewhere or other between generations. There is nothing in the present-day facts of heredity to disclose how new genes appear. On the contrary, the theory as it stands seems explicitly to preclude any such possibility. The science of biology has apparently not yet reached the stage where the professional geneticists are inclined to say much on this point. Until they do, there is nothing for us laymen to do but to wait with as much patience and hope as we can muster. We have followed them, to the best of our ability, thus far. We devoutly trust that when further explanations come they will not involve the abandonment of too much of what we have already learned with so much pains.

Race Traits: Color

To get back now to the subject of race, from which we have made a long and rather devious excursion, race and heredity are very nearly synonymous terms. The races of man are human groups that have certain distinctive hereditary traits in common, because they have a relatively homogeneous ancestry. Some of these traits that rest on

race, and hence are used as racial criteria are as follows: first of all, external color. This manifests itself in three chief portions of the body: the skin, the hair, and the eyes. Of these, the first is customarily regarded as the most important. Consequently, the commonest primary racial classification of mankind is into the yellow, black, and white races. Hair color ranges all the way from a very light yellow or corn color to jet black. It is a striking fact, however, that all the races on earth except one have black hair, and that most of the subdivisions of that one have black or brown hair. There is really only one light-haired race on earth, the so-called "Nordic." What is true of hair is true of eyes. There is only one really blue-eyed race, the Nordic, and only one race, the white, which has anything but black eyes.

Form

The second fundamental trait in which races differ from each other is form. This applies to various parts of the body, but by far the most important is the head, taken as a whole or viewed in its separate features. The most important distinction in head form is that displayed when the head is looked at from above. The conventional measure is that of the greatest width of the head compared with the greatest length taken as 100. This proportion is called the "cephalic index," and three main types are distinguished, the long-headed (dolichocephalic), index less than 75, the medium-headed (mesocephalic), index from 75–79.9, and the round-headed (brachycephalic), index 80 and up. The facial angle which measures the slope of the profile is also regarded as very significant.

Of the separate features which display characteristic variations in form the most important are the nose, eyes, and lips. The third important basic trait is size. This is significant only within narrow limits, for the variations between individuals within a race are likely to be at least as great as the variations between the averages of different races. Finally, there is the element of proportion, or the relation of the various members of the body to each other. Thus the arms of the negro are longer in proportion to his legs or to his trunk than those of the white man.

Internal Traits

All of the race criteria so far mentioned are external. Very little has been achieved in determining the internal racial differences. It appears that some such exist. For instance, there seems to be a difference between races in susceptibility to, and immunity from, certain diseases. Evidence has recently been produced pointing to a significant difference in the composition of the blood itself. The outstanding practical question, however, is whether there are true racial differences in those portions of the physical make-up, if such there be, that determine intellectual, temperamental, and moral traits. This is simply the racial aspect of a problem already faced, and there is little more that can be said in this connection. We may simply say that if these qualities are matters of inheritance at all, there is every reason to suppose that they are matters of racial inheritance, and that important differences exist between races in these traits as well as in the external bodily traits. It may be observed in passing, that just

as man's most significant evolution, that is to say, specialization, has been in his head, so the most striking racial criteria—skin color excepted—are located in the head. It would be most surprising and anomalous if all the significant variations between races were developed on the outside of the head, and none whatever in the brain, the most characteristic human organ.

Race Feeling

Whatever the final truth may be as to the actual racial differences, the fact remains that there are sufficient observable distinctions to enable even the least informed individual to know what basic race he belongs to, and to recognize other persons as belonging to the same or different races. It is also undeniably true that between individuals who recognize themselves as belonging to the same race there exists an entirely different feeling from that which prevails between members of different races. *Race feeling* is one of the basic factors which human societies have to take into account. It is useless to argue whether it is good or bad, right or wrong —it is there. It manifests itself in two contrasted aspects—sympathy (feeling-with) toward the in-group and antipathy (feeling-against) toward out-groups. We are justified in assuming that it has existed ever since the dawn of human existence, being derived in the first instance from the primitive herd instinct of gregarious animals. This was perhaps the basic force that induced men to act in groups, and by promoting coöperation and social conduct it presumably played a large rôle in the growth of civilization, whatever we may think of its utility at the present juncture. Of course it produced an attitude of hostility toward out-

side groups which in the case of primitive peoples reached such extremes that every foreigner was regarded as an enemy to be killed at sight. But even extreme inter-group hostility was not necessarily an unmitigated evil in the early stages of man's cultural progress.

Thus the primary basis of man's subdivision into more or less self-conscious groups was racial, biological. This result was associated with, was inseparable from, the process of dispersion. As time passed and new factors came into play, the isolation necessary for the preservation of racial integrity began to break down. Racial groups commenced to drift ever more and more widely over the earth's surface, setting up relations with other groups which, as some one has said, were likely to be alternately martial and marital. Thus the genes characteristic of a given race came to be more and more widely and frequently associated with those of other races. In other words, race mixture set in and has continued to be an increasingly significant factor down to the present time. Today it is extremely difficult to find any large groups of men that are racially pure, and in many groups the race mixture is extremely complex. Nevertheless, race affiliations still constitute a very important element in human relations. Race feeling is still very active. Even mixed races may have distinctive characters of their own. Racial realities underlie all the social phenomena of today, and to ignore them is just as illogical as to forget all about simple multiplication and division when one comes to deal with problems in logarithms.

CHAPTER V

MAN, THE MASTER

In discussing man's escape from the law of stationary population some time ago, we observed that it was accomplished by two chief expedients. The first of these was movement, which in the beginning took the form of dispersion, and resulted in the formation of races, among which there is still sufficient homogeneity so that man has not lost his specific unity. The other was the development of an economic culture. This now demands our attention.

We have seen that in the initial stage of man's existence as a separate species he was presumably almost as closely dependent upon nature as any of the higher infra-human species. The terms of his existence were set by the land, not by himself. For his food and his shelter he was dependent upon the supplies that nature provided ready to hand. Clothing he probably had none. His daily activities consisted in an incessant search for and appropriation of natural objects which might serve his needs, with occasional participation in mating, and periods of necessary sleep. It is reasonable to suppose that he also had some leisure for play, and for engaging in that aimless but very useful exploration into the nature of things known as "monkeying." This stage in his career is accordingly

Collection Stage

known as the "collection stage" because his energies were so largely occupied in merely collecting things. His food consisted in vegetable and animal materials that he could acquire with his unaided bare hands—"roots, herbs, barks, and berries" (in the words of the soft-drink vendor at the circus), nuts, fruits of all kinds, bird's eggs and young birds, small animals, insects and grubs of various kinds. All these, of course, he ate raw. This restricted basis of subsistence had two main consequences. It meant in the first place that man's existence was arduous, dull, and monotonous, with scarcely a trace of the higher enjoyments and satisfactions that we now think of as distinctively human. In the second place it meant that only a very small number of human individuals could be supported on a given area of land. On the collection stage, even with the expedient of movement developed to its full extent, man would sooner or later have had to yield to the dominance of the law of stationary population.

Tools

Man's emergence from this inflexible situation, and his progress to his present high estate, have been characterized by certain outstanding achievements in economic technique, which have had the effect of releasing him ever more completely from entire subjection to the land, and giving him command over the forces of nature. The first of these steps consisted in the discovery or invention of certain simple material devices known in general as tools. Whether a wholly natural object, used purposefully by a living creature to accomplish some end, ought to be called a tool is perhaps open to question. If so, we

must admit that the higher apes and monkeys use tools. They not infrequently pick up a stick or a stone and use it for some simple purpose. A realization of this fact has tended to discredit the characterization of man, once popular, as the "tool-using animal." But so far as we know, no other animal than man has ever *made* a tool, and to describe man as the "tool-making animal" seems to be sufficiently accurate.

Our earliest human ancestors very probably were quite in the habit of using sticks and stones to aid them in the food quest or for other purposes. Some time or other, somewhere, some great primitive inventor, for the first time in all eternity, deliberately *modified* some natural object to make it serve his needs better. This act, if we only knew what it was, ought to be represented in every industrial museum in the world as the starting point of all economic achievement. For that matter, it ought to be recognized as the starting point of every art or science that uses material implements of any kind. What the specific first invention was we shall presumably never know. But we do know what one of the earliest economic devices was. It was the stone hammer. The central theme of this invention was the putting together of the two tools already in commonest use—the stick and the stone. A stone hammer is a stick with a stone fastened on to the end of it. To produce this result is genuine manufacture, even though the form of neither the stick nor the stone is altered in the least. It is reasonable to suppose that this was the case with the earliest hammers. Even in this simple form it must have given its possessor a great

advantage. A stick held in the hand is, essentially, a lengthened arm. A stone held in the hand is a hard fist. A stone tied on to a stick is a hard fist at the end of a long arm. Any one familiar with hand-to-hand encounters either with animals or human antagonists can readily appreciate the advantages that are involved.

In the beginning tools were unspecialized. There was no distinction between implements and weapons. The same device would serve equally well to crack a coconut or the skull of a rival. Instruments of war and of the chase were indistinguishable. The actual power over nature conferred by the stone hammer was itself a notable gain. Imagine the thrill experienced by this early innovator when he suddenly realized that with his new equipment he dared attack an animal that previously had been more than his master! Imagine also the consternation felt by his human enemies when he leaped upon them with this incredible, unheard-of device. The first Big Bertha of the World War was not half so terrifying. But the salient contribution of the stone hammer was the introduction of a new principle, the manipulation of material objects into new forms. Invention is cumulative. Each accomplishment serves as a foundation for something higher. Not only upon the hammer, but upon the idea back of the hammer, rests the entire towering edifice of technical industrialism. The hairy savage who first bound a stone to a stick was a greater inventor, and conferred vastly larger benefits upon mankind, than any Edison or Marconi or Pupin of this age of mechanical marvels.

What we know about early stone hammers is mostly restricted to the stones. These have survived in considerable numbers and we can handle them and study them. The sticks have long since decayed and disappeared. Our ideas about them are mostly inferential. The most important feature, clearly, is the method of attaching the head to the handle. At first this had to be done without altering the form of the stone. This could be managed by selecting a forked stick, or by choosing a stone so shaped that a straight stick could be bound to the side of it. Eventually men learned to drill a hole in the stone, and insert the handle therein. This was a relatively late improvement, and most of the varieties of hammers in use today exhibit its influence.

Stone Hammer

Once the idea of tool-making became established, various applications followed. There appeared the javelin and the bow and arrow, flint spear and arrow heads, scrapers, and various kinds of traps and pitfalls. Probably the most revolutionary consequence of these new devices was the ability to capture or kill much larger game than previously. They introduced the era of real hunting. Accordingly the new stage in human social evolution, the first stage that can be considered to manifest any true culture, is universally known as the "hunting stage."

Hunting Stage

While the primary factor in the hunting stage is primitive man-made tools, there is a second element to be observed of an entirely different sort, but hardly inferior in importance. When men began to hunt large game, or to use traps and pitfalls, they learned

that results could be achieved by a number of persons working in harmony that were impossible to a single individual. Thus there arose the hunting band. The principle back of this device was almost as revolutionary as that back of the stone hammer. This was the principle of mutual aid. It is true that in a very elementary form this principle can be detected in the lower gregarious animals, and some observers regard it as a frequent phenomenon in nature. Animals warn each other of danger, and some of them hunt in packs. But deliberate coöperation directed toward a preconceived end was almost unknown among men living on the collection stage. When one's livelihood depends upon natural products, of which there is only a limited supply in any region at a given time, the economic ideal is to be alone in the wilderness. Every other human being is a competitor and a rival. In so far as the gregarious principle prevails in nature it is only because the advantages of group life offset the disadvantages of competition in the food quest. But when the stage is reached where by coöperation not only can the total amount of food, but the per capita amount, be increased, there arises a positive incentive for community effort. It is in the hunting stage, then, that we find the first definite evidences of the process of socialization in a distinctly human sense. Whatever group life there may have been previously in connection with the horde or the primitive family organization can hardly have been much above the instinctive animal level.

From the point of view of population, the effect of

the hunting stage was to enable a much larger number of men to live on the same area of land, and to live better. It was the first great advance in the emancipation from the law of stationary population through the development of economic culture. But it was only the forerunner of still more consequential achievements.

Pastoral Stage

The next great stage was initiated by the discovery of the domestication and controlled breeding of animals. Here again our knowledge of the first steps is very scanty. We do not even know what animal was first domesticated. It may have been the dog. If so, it would seem to indicate that man had already developed powerful interests quite apart from the food supply. For it is wholly unlikely that the dog was domesticated for purposes of food, but rather for companionship, play, and possibly protection and aid in hunting. However this may be, most of the domesticated animals, and probably all of the earlier ones except the dog, were chosen because of their suitability as food providers. Probably in the beginning it was their flesh that was wanted. They were a sort of game that was relatively easy to capture and safe to keep in captivity. We can imagine that the practice of keeping them alive arose when some hunting band after an unusually successful foray, found itself supplied with more meat than could be eaten at the moment, in spite of the vast capacity of primitive men in this respect. Some genius suggested tying one or two of them up, or securing them in some kind of a pen or enclosure. This was merely a matter of live storage instead of cold storage. But eventually some

greater genius called attention to the fact that the females of these animals—the goat, the sheep, the cow, the mare—gave milk which was a very nourishing and palatable food for humans, and furthermore that by keeping the animal alive indefinitely and milking it, it could be made to yield a much greater total supply of food than if it were killed and eaten.

Thus was introduced a further social principle of inestimable significance, the principle of turning consumption goods into productive capital, of foregoing the immediate enjoyment of wealth in order that it might be made to yield income. The implements of the hunting stage were true capital (material wealth used in the production of more wealth) but they were nothing but capital. There was no temptation to use them for immediate gratification. They involved the effort of production, but they did not require the sacrifice of actual saving. The establishment of the pastoral stage depended upon an unprecedented degree of forethought and self-control. Since these are highly socializing forces, the development of community life moved forward notably. In fact, as the pastoral stage becomes well developed we find social units of a considerable degree of organization. Coöperation sometimes reaches really remarkable heights, as any one can attest who has seen that extraordinary moving picture, "Grass," in which the idea of working all for each and each for all is displayed on almost every foot of the film. And here again, we find the supporting power of the land vastly augmented. A community that uses its land for the maintenance of animals to supply milk

foods, and the occasional luxury of meat, can support a much larger number of souls than if it utilized its land merely for hunting and collection. Likewise, the scale of life is greatly improved.

This story of the upward march of man along the economic pathway is fascinating and alluring, but it is long, and we must resist the temptation to dwell upon its details. The next great advance was signalized by the domestication and controlled breeding of plants. It may seem strange that men should have learned how to handle animals before they learned how to handle plants. But this seems to have been the order all over the world, with the one outstanding exception of the American Indians. It may have been because the plants were so much more available in their wild state, so that domestication was less needed. Wild plants did not have to be caught or killed. In due season, however, men began to take control of the breeding and growth of plants, and so the agricultural stage was introduced. There are three basic elements in agriculture. First, the substitution of useful plants for useless plants. Second, the improvement of the food-yielding qualities of plants. Third, the increase in the fertility of the soil. The first-named was probably the first in time. Primitive man learned either to cut down trees or to kill them by fire or girdling, and to plant in their place the seeds of wild grasses, or fruit-bearing plants. Little by little he learned to stir up the soil with a digging stick, hoe, or plow, and to fertilize it with the ashes of the burned trees or the manure from his stock pens and stables.

Agricultural Stage

And finally, by who knows what interminable process of trial and error, he learned to improve the yield of each respective type of plant, until a species of wild grass yielding a scant thimble full of seed becomes the heavy-headed wheat stalk, a sour acrid little nubbin of fruit becomes the potent apple that keeps the doctor away, or an insignificant berry, delicious enough to be sure, becomes the imposing strawberry of the market garden.

The increase in the supporting power of the soil associated with agriculture is immeasurable. Density of population is really the concomitant of agriculture. Where formerly a few roving bands held possession of the soil, now hamlets and villages dot the plains. At the same time, agriculture introduces its own social principle, that of fixity of residence, and stability of possessions. The pastoral people is a nomadic people. All its institutions and all its equipment rest upon the assumption of movement. Even the dwellings must by portable. But on an agricultural economy people begin to build homes in which they expect to live out their days, and their children after them. Land in its turn becomes capital. The principle of saving is accentuated by the necessity of keeping seed until the next season. One can imagine something of the bitter experiences by which the first agriculturists learned that, come what may, seed must be saved. One can appreciate the terrific temptation it must have been in a period of unusual dearth to dip into the little hoard of grain that could be consumption goods just as well as capital. How often the temptation must have pre-

vailed when it seemed to be a matter of life and death is attested by numerous contemporary instances occurring in countries like Russia, China, and India.

Industrial Stage

Finally comes the Industrial Stage, the characteristic feature of which is the machine. A machine is something more than an elaborated or complex tool. The difference between the two can perhaps best be indicated by a rather dogmatic generalization: The function of a tool is to aid man in his productive activities, that of a machine is to supersede man in his productive activities. Almost all tools are essentially improvements (from the industrial point of view) on parts of the human body; they are stronger fingers, sharper teeth, harder finger nails, tougher fists, longer arms, etc. But the tool is helpless without the human mind and bodily strength to direct it. The machine, on the other hand, is in general a tool plus two other factors. These other factors are a device to hold and direct the tool, and a source of power, including means of transmission. A power lathe will serve as an excellent illustration. The part of the lathe that does the actual cutting, the knife or chisel, is not materially different from a similar tool used manually by a human being; it is significant that it is detachable, a separate part of the machine. The rest of the lathe consists first of a framework and two devices to hold the tool and the material worked upon, and, second, a source of power. These are obviously substitutes for the human body as a whole, and the arms and hands in particular. The machine era, therefore, is marked on the one hand by a vast ex-

tension of an equivalent for man power, and on the other hand by a marked decline in the demand for actual man power, relative to a given volume of production. These two features underlie many of the characteristic phenomena and problems of the modern epoch.

Machines, and all that goes with them—factories, steamships, railroad systems, etc.—are distinctly and almost exclusively capital. Very few of them can be used as consumption goods, and there is very little temptation to devote them to immediate bodily satisfaction. In this respect they differ from the characteristic capital of the pastoral stage, and part of the capital of the agricultural stage. This feature tends to facilitate the accumulation of capital in modern societies and helps to put capital in such an eminent position that it has given its name to the present era.

Like every other one of the great economic discoveries, the introduction of machinery and the factory system has added immeasurably to the supporting power of a given area of land. It has made possible our great industrial cities, and has increased the density of population in large areas to over 600 persons to the square mile. And at the same time it has enabled man to live on a much higher level of material comfort.

Other Stages

It is obvious that this classification of man's economic progress takes account of only a part of the inventions and discoveries upon which he has moved forward and upward. Other classifications have been made, resting on other types of achievement. One of the most familiar of these is

based upon the characteristic material of man's tools and implements at different stages, and exhibits a threefold division—the stone age, the bronze age, and the iron age. The stone age in turn is divided into the eolithic, paleolithic, and neolithic periods. Another classification might be based upon the knowledge of the use and making of fire. Possibly no one thing has contributed so much to man's economic achievements as the mastery of fire. This illustrates once more the distinction between endowment and achievement. The knowledge of how to use and preserve fire, or even how to make it, does not require a very high order of intelligence. No great stretch of the imagination is demanded to conceive that apes as intelligent as the chimpanzee might have discovered how to use and keep fire. But they never did. How much this one attainment of man's may have done to widen the gap between himself and his anthropoid kin, it would be impossible to say.

Nature of Economic Culture

Is it any wonder, then, in view of the remarkable achievements of the past and the continuously accelerating increase of human population, that we of the present generation, inheritors of the accumulated products of preceding civilizations, should easily fall into the assumption that there are no assignable limits to man's conquests over matter, and no bounds to his potential increase in numbers and wealth? Many hackneyed proverbs support this view. "What man has done man can do." "History repeats itself." "Man is the lord of creation." So insidious is this attitude, and so prevalent,

and at the same time so fraught with possible disaster, that it is imperative for the objective student of human affairs to understand clearly the exact nature of what has been accomplished in the past, and the conditions under which it has been done. Then he will be equipped to contemplate the future and its possibilities with a measure of understanding and true vision.

What is the inner character and meaning of economic culture? Just what have men been able to do hitherto?

In our discussions up to now we have laid stress on food and the production of food, as if food were the only economic good. It is undeniably the basic economic good, and for the lower animals practically the only one with the exception of whatever they enjoy in the way of shelter. But one distinctive feature of man's upward march has been a steady increase in the number and extent of material needs, and of the goods to supply them. To understand the meaning of the successive stages of economic culture, therefore, it must be remembered that each characteristic improvement or discovery added not only to the food supply but also to a variety of other material supplies. Thus the devices and arts that ushered in the hunting stage not only amplified the daily bill of fare, but also added most acceptably to the available materials for clothing (skins and furs) and for the manufacture of tools and ornaments (bones, teeth, etc.). Likewise the pastoral economy provided skins for the building of tents, fibres for the manufacture of textiles, beasts of burden to lighten man's load and widen his range, and many

other comforts and simple luxuries. The improvements in agriculture not only magnified man's control over the food plants, but also enabled him to provide himself with innumerable varieties of fibres, medicinal substances, stimulants and sedatives, building materials, and industrial products.

It should also be remembered that each of these stages has meant the addition of something new to that already enjoyed rather than a complete shift of economic base. When men learned to hunt they did not stop collecting. The pastoral stage did not eliminate hunting, nor the agricultural stage, stock-raising. The industrial stage has kept all of the previous features so far as they are useful. We today not only manufacture, but we farm, raise stock, hunt, and even collect. Our economic culture, accordingly, not merely increases the volume of our supplies, but increases their variety, and adds to the possible richness of occupational experience.

It is hardly necessary to enlarge upon the glories of our modern economic civilization—they are evident enough. What concerns us is the relation it all bears to the earth itself, what connection it has with the life-land bond.

Fixed Basis of Achievement

From this point of view, the first thing to bear in mind is that, with all his phenomenal achievements, man has never yet added a single atom to the materials with which the earth is supplied, nor has he altered in the minutest degree the essential qualities of any element of matter. The earth is exactly the same earth that it was when man first

appeared upon it half a million or more years ago. What he has accomplished has been first through changes in the forms and relations of matter and second through a more complete utilization of the matter that exists.

Substitution of Life

We have already seen that the world always is, and always has been, as full of life as it can hold in view of the forms of life that exist at any given time, but that there are always unoccupied niches available for a new type of life provided it is adapted to take advantage of them. The new type of life may establish itself by appropriating a really vacant niche, or by crowding older types more or less completely out of the niches they occupy. Man was a new type of life, and he has spread himself by both of these methods. To a certain extent he has taken advantage of a niche filled by no other animal; but to a very large extent he has crowded other animals and even plants out of their niches and so out of existence. This is a phase of man's progress too little considered. We fail to reflect how largely man's escape from the law of stationary population has been due not to his success in increasing the life-supporting power of the earth, but in supplanting other forms of life by human life. Man, by his unique qualities, has been able to put himself in a dominant position where he controls practically every other form of life. From this eminence he evaluates all other forms of life according to whether they are useful, harmful, or indifferent to himself, and acts accordingly. Man's economic progress has been very largely a proc-

ess of exterminating the plants and animals that were useless or harmful to him, and giving their places to useful forms. When we consider how vast was the existing volume of life when man first appeared, it is not difficult to realize that this expedient alone would have provided for the increase of human population to a very large figure and over a very long period of time. But this is a process which has its inevitable limits. There is just so much land area and just so much water upon the earth. The limit of this expedient will be reached when every animal and plant useless or harmful to man has been extirpated, and its place given to something serviceable, in other words, when every atom of the life-supporting material of the earth is devoted to the maintenance of some creature that man desires to survive. How nearly this culmination has been approached is forcibly impressed upon one who travels by air over some of the older countries of Europe, and sees how infinitesimal are the waste spaces still remaining, and how intensively every acre of soil is turned to whatever use it can best serve. Even in our own country, especially in the regions of older settlement, it is easy to see that very little space is occupied by organisms undesired by man. The memories of the vast herds of buffalo and flocks of pigeons, the sight of our rapidly dwindling forests, the reminders of the constant struggle required to preserve any of our game or other wild life, bear eloquent testimony to the success with which man, in this area of very recent civilized cultivation, has substituted human life for other forms of life,

and turned the life-supporting qualities of the soil into man-supporting qualities exclusively.

Much of this result could have been achieved without any far-reaching or deep-probing interference with the natural forms and relations of matter, merely by a more complete utilization of the supplies that exist. But man's facile and fertile brain did not allow him to remain content with this basis of progress alone. He was impelled to penetrate into the most intimate secrets of nature, and get his hands upon the elemental forces themselves. This is the realm of science.

Adaptation of Environment

If we may permit ourselves another sweeping generalization we may say that every other organism, and man himself in his early stages, has been able to survive only by adapting itself to the natural environment, while recent man has been able to adapt his environment to himself. To understand all that this implies, we must reflect that man has two environments to consider. He has not only a physical or natural environment to reckon with, like all other organisms, but he has himself built up a human environment, which now conditions all his activities, and requires at least as much adaptation on his part as the physical. His unique achievements are due to a partial mastery of both.

Physical Environment

Consider first the physical environment. This is the world as it existed previous to man's appearance. At first man knew little more about the world than did his non-human kinsmen. He reacted in an essentially instinctive way to the stimuli

of the environment, but as to the nature of the environment he had very little conception. But among the other characteristics of man there was, as we have noted, a pronounced tendency to try things out, to handle them, smell them, taste them, and "monkey" with them in various ways. This primitive behavior was the beginning of investigation and research, and therefore of knowledge and science. In time this elementary curiosity developed into a genuine desire to know, to find the explanation of things, particularly of natural phenomena. Little by little man began to know nature. This knowledge was at first purely empirical, the result of innumerable repetitions of trial and error, trial and success. It was wholly external or superficial knowledge. Man learned the way nature acted, but he had no idea why. He learned that fire burns, and eventually learned how to make fire. He learned that black clouds, thunder, and lightning precede a storm. He learned the ways of wild creatures, and the succession of the seasons. Gradually there dawned upon him a realization of the constancy of nature, the dependability of the environment. On this foundation he was enabled to build an edifice of rules of behavior, a code of practical knowledge. But for countless ages these rules were in the nature of mere arts. Men learned what to do in order to produce certain results, but they had no idea why the results followed their actions. They learned to cook, to weave, to make baskets and pottery, to breed animals, to fertilize the soil, to build palaces, tombs, and temples. And eventually, late in time, there dawned the idea that back of this reliability

of nature there must be some great constants, an understanding of which would endow man with power hitherto undreamed of. So there emerged the concepts of natural forces and natural law which are the foundations of science.

It is well to distinguish between science and the scientific method. The scientific method is the underpinning of science, and no science can exist without it. But a science does not necessarily develop from every application of the scientific method, no matter how long and conscientiously continued. A science arises only when the scientific method reveals the existence of natural forces and natural laws in the given field of investigation. What, then, is the scientific method?

Scientific Method

The scientific method consists in a few procedures, easy to name and describe, but discouragingly difficult to follow out. First there must be a body of data or phenomena, commonly designated "facts," which are believed to be so homogeneous or closely related as to justify treating them as a united whole. This means, obviously, that a certain amount of commonplace, rule-of-thumb knowledge must exist before a scientific research can even be thought of. This knowledge may have been acquired in a variety of ways. Nobody could ever have conceived of a science of chemistry if a large mass of knowledge about the behavior of certain kinds of substances had not been acquired through the arts of cooking, painting, pottery, etc., and the search for the philosopher's stone. No one would have dreamed of a science of astronomy if the movements of the heavenly

bodies had not long been studied for the purpose of determining their influence on human destiny. Even the basic method of mathematics arose only out of man's experiences in counting and measuring. Thus every accumulation of knowledge, scientific or other, paves the way for further scientific research.

Having selected a body of data for investigation, the next step in the scientific method is an extended, penetrating observation of these data. This is the most arduous, and in many ways the most difficult, of all scientific processes. It is hedged about with many pitfalls, and demands peculiar qualities of the investigator. A genuine scientific investigator must first of all be equipped with a dependable set of senses. He must be able to see, hear, feel, taste, and smell accurately. Next he must have a perfectly open mind, that will enable him to approach his data in a completely detached, impersonal, objective attitude. He must be able to give every fact an equal welcome, and accord it its full weight, whether it be for any reason acceptable or unacceptable to him. He must be able to record the facts exactly as he observes them, in such a way as to leave no doubt on future reference. He must be able to prevent any personal interest, bias, or preconception from influencing his approach to his data or his reaction to them. He must, of course, be industrious, persistent, and resourceful in his search.

Observation

It is hardly necessary to observe that the true scientific investigator is *rara avis*. Particularly difficult of achievement is the impersonal, receptive attitude toward

all facts. In fact it is doubtful, particularly in the social sciences, whether it is possible for any mortal to divest himself entirely of the influence of personal interest, associations, predilections, and dispositions. It is easy to deceive ourselves on this point. When you hear a man preface a statement by the remark, "Now I take an entirely impartial view of this subject," you may be on the look-out for a peculiarly biased observation. All that most of us can hope to do is to recognize our shortcomings frankly and strive earnestly to discount them as far as possible. It is not a bad idea, in presenting the results of an investigation to the public, to state openly the affiliations and interests of the investigator. For instance, if it is a study of industrial wages in New York City, let it be announced that the investigator is Mr. A., son of a prominent manufacturer, graduate of X university, and employed by the National Producers' Association, or Mr. B., formerly walking delegate of the Hatband Makers Union, now secretary of the National Federation of Handworkers, or Miss C., secretary of the Commercial Personnel Workers' Association, and member of the Socialist party. Granting equal conscientiousness on the part of each of these investigators, we are likely to get very different reports from them even in the almost mechanical task of recording wages.

Classification

Having assembled as large a mass of data as conditions permit, the next step is to classify them. Here again, some previous knowledge of the field is almost indispensable. A sound classification always requires a predetermined

basis. This basis consists of some principle of likeness or difference upon which the items are to be distributed into categories. Without some knowledge as to what likenesses or differences are significant no intelligent selection of a basis of classification is possible. There may be many different classifications of the same body of data, resting upon different bases. Some notion of the purpose of classification is therefore also necessary. Otherwise there must be a long period of groping and fumbling strongly suggestive of the "monkeying" of the primitive investigators.[15]

Generalization

The central purpose of classification is generalization. A certain amount of generalization is implied in the very selection of the data. Some element of likeness is recognized in advance, before the investigation can be even started. The investigator of wages must know what he means by wages. The research worker in rubber differentiates rubber from all other substances. But the scientific method aims at more detailed generalization. It seeks to establish not only the qualities of the material as a whole (some of which are already known) but the qualities of different sections of the material, or its behavior under different types of conditions. The next step, therefore, is to interpret the classified data. Here the distortion of the personal element is even more imminent than in observation. Only when the evidence of the classified data is of such a nature that every competent student must perforce make the same interpretation is there an actual proof. A proof, or demonstration, it may be observed in pass-

ing, is the establishment of a certain conclusion by such evidence that any one who has the intelligence to understand the evidence must accept the conclusion.

If the evidence is of such a sort that only one interpretation is possible, there follows the final step in the scientific method, the induction, the enunciation of a law. Seldom is a genuine law arrived at as the result of any one investigation. The inductive generalization is usually stated as a "hypothesis," which is merely a tentative statement of the message of the evidence. This hypothesis is then subjected to further investigation, as extensive and diversified as possible. If all the evidence tends to confirm the hypothesis, in the course of time it is promoted, and becomes a "theory." Again the processes of investigation and testing are carried out, and again, if undamaged, the theory is promoted and becomes a "law." It is safe to say that at least one definitely established law is required before any body of knowledge can fairly be called a science.

Law

The central feature of science, then, is law and the central feature of natural science is natural law. Scarcely anything is more essential to a comprehension of this scientific era of ours than an accurate understanding of the meaning of natural laws. Recalling what has just been said about the origin of natural laws, we may set up the following definition: A natural law is man's statement of the way things in nature have been observed uniformly to happen. I venture to suspect that this definition arouses an immediate challenge in your mind. Most people require something more

definite and immutable as their conception of natural law. Well, let us see.

All that we know about nature comes by way of observation. All the accumulations of scientific facts in all the libraries of the world are merely the records of persistent, painstaking, multitudinous observations. If, in a given body of recorded observations, we can discover no order or consistency we do not attempt to set up, or even assume the existence of, a law. But if we detect consistency, regularity, constancy, and reliability in our observed facts, then we generalize: "Such and such materials always behave in such and such ways." "When such and such conditions exist, such and such a phenomenon always appears." "Such and such a cause always produces such and such an effect." The key to our generalizations is "always." But what do we know about "always"? As a scientific term it can mean nothing more than, "every time we have watched." Anything beyond that is mere conjecture or belief. What happens is this: After we have observed the same thing to happen invariably under the same circumstances an innumerable number of times, we jump to the conclusion that it will happen again in the future, in just the same way, every time the circumstances are repeated. We say: "Nature works this way; this is a natural law." But our only basis for saying that nature works this way is that, so far as we have observed, nature has worked this way in the past. Our assurance that nature will work this way in the future is pure assumption.

But it is an assumption that is fundamentally impor-

tant to us, and that we cling to tenaciously. We believe that nature is constant, and we refuse to relinquish that belief. It may be that nature really is constant, and that natural objects and materials do behave in an absolutely unvarying and inflexible manner. It may be that there are theoretically possible statements of the way things really do happen in nature, and that these are the final and true natural laws. But beyond what our observation teaches us we know nothing of these laws; their existence is a matter of sheer belief, and the formulations of science take no account of belief.

Natural Law

The behavior of things in nature, upon which we base our natural laws, is the outcome of natural forces, and they, in turn, are the products of the qualities of matter. In the last analysis, then, our confidence in the immutability of natural laws rests upon our belief in the fixity of the qualities of matter. The characteristics of the atoms of the various elements constitute the starting point and foundation of all the physical sciences. If there were the slightest deviation or capriciousness in the behavior of the atoms there would be no constancy in the natural laws, and there could be no science. We believe that there is nothing of the sort, but that the elemental qualities of matter are the same yesterday, today, and forever. But our only basis for this belief, *on scientific grounds,* is our observation. Any other ground of belief, any conviction that things *must be* so, savors of intuition, mysticism, or religion.

Several recent developments have tended to shake our confidence in the conventional conception of natural

law, and even in the regularity of natural processes themselves. The most spectacular of these was Einstein's theory of relativity, which most of us are quite incompetent to understand, but which seems to have created considerable commotion in the ranks of the physical scientists. There appears to be a general tendency among physical scientists to regard the laws of those sciences as statements of probability rather than of absolute and undeviating certainty. Thus the second law of thermo-dynamics, which lies at the very foundation of all mechanical science, is now considered a statement of very high probability rather than of positive certainty.

In this connection one of the most eloquent exponents of the new science, Professor Gilbert N. Lewis, speaks as follows: "Do you believe in miracles? Let us consider a box with a one-gram weight resting on the floor. Let us place this box in a bath maintained at an extremely constant temperature, we will say 65° F., and let the whole be protected by the most perfect mechanism that we can think of to shield it from external jars. Let us, in other words, shut it off from all external influences, leaving only a small hole through which we may observe the weight. We may look into the box millions of times and always find the weight upon the floor, and we then state this to be a law of nature. But the time will come when we look in and find the weight some distance from the floor. It will not happen often, but we can calculate with a high degree of accuracy the chance of finding it, let us say, ten centimeters from the floor. . . . The chance becomes larger if I consider

smaller weights and lesser heights from the floor . . . and if we examine particles which are just visible with a good microscope we find them hopping about in what is known as the Brownian movement . . . if the jumping of the one-gram weight was a miracle, here in the Brownian movement thousands of such miracles are constantly occurring before our eyes. It is not true that things left to themselves approach a constant state, but only that they approach a state which ordinarily appears constant to us because of the dullness of our perceptions." [16]

This seems to mean that in judging a scientific hypothesis we are entitled to consider not only the supporting factual evidence but its inherent probability.

Knowledge

This critical, and perhaps seemingly unsympathetic, examination of science is intended as a warning against very prevalent dangers in our modern life. We are likely to be so hypnotized by the stupendous accomplishments of science that we exaggerate its possibilities, and attribute to it powers that it does not possess. The limits of a science are set by the nature of the materials with which it deals. The value of a science depends upon what it enables us to know. Now "know" is another word subject to vast misconceptions, and shocking abuse. Listen to an ordinary half hour's conversation and you will probably hear the word "know" used to express states of mind that should accurately be rendered as "I believe," "I think," "I have heard," "I suspect," "I should like to believe," "I am convinced" and so on indefinitely. What is it to know, and what

is knowledge? These are two of the profoundest metaphysical questions of all time, and we shall not invade the field of the philosopher sufficiently to attempt to answer them in any inclusive or final way. Knowledge in the strictly scientific sense is a more tangible thing. The most important point to grasp is that it rests entirely upon the evidence of the senses. Furthermore, the knowledge possessed by any individual is restricted to the evidence of his own senses. You know that there is a house in which you live, a bed in which you sleep, a whistle that blows at seven o'clock because you have seen, felt, and heard them. But do you know that there is such a city as Constantinople if you have never been there? Your first reaction is to say, "Why yes, of course I know it!" But test the grounds of your knowledge. In the last analysis you will discover that what you call your knowledge rests upon somebody else's say-so. You have talked with people who say they have been there, and show you pictures of the Mosque of Saint Sophia and the Galata Bridge. Your history, and geography books make references to it and show you its location on the map. The daily paper prints news items dated from Constantinople. The evidences are overwhelming. Yet your acceptance of every separate piece of evidence involves your acceptance of the credibility and veracity of some other observer. And this is purely a matter of *belief*. The great bulk of the common knowledge of the group in which you live, you, as an individual, accept on faith. All of us are dependent for a vast amount of knowledge upon authority. Belief permeates our entire intellectual life.

Furthermore, all strictly scientific knowledge is a matter of the past or the immediate present. Even with respect to the most invariably repetitious processes of nature we can not say that we know they will recur in the future. We do not know that the sun will rise tomorrow, or that the rivers will flow down hill, or that winter will be succeeded by spring. All true knowledge stops at the threshold of the future.

Finally, we must recognize that there is an element of belief in even the most rigidly scientific knowledge.

Belief

A modern novelist, writing in a university publication, made the statement, "The scientist is in the enviable position of the man who, believing nothing to begin with, is therefore ready to believe anything sufficiently proven, while the mass thinker is in the pitiful position of the man who, to begin with, believes so much which afterwards turns out to be fraudulent that he usually ends by believing nothing." [17] Nothing could be more misleading than to say that the scientist begins by believing nothing. All scientific procedure rests upon certain fundamental beliefs. First and foremost the scientist believes in the reliability of his own organs of perception. When he looks at a thing, he believes that it is what he sees it to be. There is no proof of this, nor can there be. There is no proof that when you and I look at an object that we both call red you see the same thing that I do. In the second place, as we have seen, the scientist believes in the constancy and dependability of the materials he works with. An older novelist saw the truth more clearly. "And so my hero returned almost to the point from which he had started originally, namely, that the

just shall live by faith. And this is what the just—that is to say reasonable people—do as regards those daily affairs of life which most concern them. . . . There can be no doubt about faith and not reason being the *ultima ratio.* Even Euclid, who has laid himself as little open to the charge of credulity as any writer who ever lived, cannot get beyond this. He has no demonstrable first premise. He requires postulates and axioms which transcend demonstration, and without which he can do nothing. His superstructure indeed is demonstration, but his ground is faith. Nor again can he get further than telling a man he is a fool if he persists in differing from him. He says 'which is absurd,' and declines to discuss the matter further. Faith and authority, therefore, prove to be as necessary for him as for anyone else." [18] And Spengler, one of the most erudite of modern philosophers, in a more academic vein repeatedly emphasizes the same point. "And then, for the first time, those who thought deeply were obliged to see that the Euclidean geometry, which is the *true and only* geometry of the simple of all ages, is when regarded from the higher standpoint nothing but a *hypothesis,* the general validity of which, since Gauss, we know to be impossible to prove in the face of other and perfectly non-perceptual geometries. The critical proposition of this geometry, Euclid's axiom of parallels, is an *assertion,* for which we are quite at liberty to substitute another assertion." [19]

This emphasis upon belief is salutary because, as has been observed, we are all prone to fall victims to the scientific obsession of the day, and to idolize knowledge.

The essence of idolatry is to magnify its object, attributing to it virtues which it does not possess, until it eventually becomes deified. Such an object is a fetish, and scientific knowledge is a fetish in contemporary society. We have come to look upon science as an end in itself, whereas, properly regarded, it is only a means to an end. The end itself is supra-scientific. No delusion is more deadening to intellectual attainment than the assumption that nothing is true that can not be proved. The true basis of conduct, whether or not it should be, in fact must be, belief.

Scientific Belief

Having gone to this extreme in depicting the qualified character of what passes for scientific knowledge, it is now necessary to observe that there are various forms of belief, differentiated by the basis upon which they rest. There is belief that rests merely on intuition and introspection. There is belief that rests upon desire—"wishful thinking." There is belief that rests upon all kinds of inconsequential evidence—hearsay, rumor, tradition, superficial seeming. Finally there is belief that rests upon the totality of the best accumulated knowledge available. This last is what fully deserves the name "scientific belief." There is no fundamental antagonism, no irreconcilable discord, between belief and science. Just as all science rests ultimately upon fundamental beliefs, so all practical belief makes use of the testimony of science. The truly wise and fortunate man is neither one of the persons mentioned in the passage quoted above. He is neither the man who starts by believing nothing nor the man who starts by believing

everything. He is the man who starts by believing just so much as is necessary to start at all, and then proceeds to enlarge, amplify, and enrich his belief by all the contributions that he can induce science to make him. Sound, constructive, reasonable belief takes cognizance of all the accumulated knowledge purveyed by personal experience, accepts everything certified as knowledge by those whose testimony merits faith, including expert specialists at one extreme and the great mass of common humanity at the other, constantly checks itself up against new experience and new evidence, clings to nothing and forsakes nothing just because it is either old or new. In short, the wise and fortunate man is the truly educated man. The essential function of education is to provide men with the soundest, most reliable equipment of beliefs possible. To this end it provides access to all the amassed facts that the scientific research of the world has unearthed. It familiarizes its devotees with all the intelligent interpretations of these facts. It suggests the possible implications of various interpretations. It expounds the beliefs that the great men and women of all times have accepted as guides to their lives. But in the last analysis it leaves the individual free to check up his own beliefs against the facts and the interpretations as best he can, and to govern his life accordingly.

As brainy animals destined to live out our careers upon this mundane sphere, we may be profoundly thankful that scientific research has detected an amazingly high degree of regularity in the behavior of objects in nature, and that each new extension of the sci-

entific method tends in general to confirm the dependability of nature rather than to undermine it. We do not need to know what the future will be. It is enough that the probabilities are almost as infinity to zero. To quote Professor Lewis once more: "A law of nature becomes a better law when we can predict the exceptions to it. If someone tells you that the sun will continue to rise and set through all future time you are not deceived by the finality of the statement. You know that here and there through the galaxy of stars many cataclysms occur which would wipe out whole solar systems. If through a study of the average frequency of such occurrences, or through a study of the movements of all known bodies in the neighborhood of the sun we predict that the earth will be safe for another trillion years, we have far more information than is furnished by the trivial statement that the sun will go on rising forever." [20]

In fact, we are in a stronger position if we say we believe than if we say we know. For if we act on the assumption that we know, there is a chance that we may be wrong, whereas if we act upon belief we will not be overwhelmed by an improbable but not impossible eventuality.

Practical Tests

The best proof of the validity and wisdom of acting upon the best available knowledge, and treating it as if it were a practical certainty, is found in the very success of man in mastering nature, the consideration of which led us into this discussion. Man has to a large extent conquered his physical environment. Not that he has completely detached

himself from its conditions. That will probably always be impossible. But he has reversed the original relationship. He has adapted the environment to himself. In so doing he has exemplified the great paradox of earthly life: If you obey Nature she will serve you; if you defy her she becomes your master. Man has dominated Nature by learning her laws as best he can and obeying them. He has bent every natural force to serve human ends. He has mastered the land, the sea, and the air. The last realm to challenge his conquest is the kingdom of microörganisms—germs, bacteria, microbes—and he is rapidly bringing that under his sway.

It is not inconceivable that in the not distant future man will have gained control of practically every important natural force. That will be a notable day, but it will not be an occasion for unalloyed felicitations. For it will mean that the basis of material expansion upon which the economic culture of the past has rested has come to an end. The earth is finite. Even though man releases the energy of the atoms, he will not have tapped an indefinitely elastic reservoir. There is no present ground for believing that the earth offers unlimited resources for human expansion.

CHAPTER VI

THE CHALLENGE OF THE HUMAN ENVIRONMENT

In the mean time, man does not have to sigh for new worlds to conquer. He is already faced with a new challenge—the challenge of the human environment. The happiness of mankind is in the last analysis the happiness of the individual, and the well-being of the modern individual is at least as dependent upon the human environment as upon the physical. The human environment is vastly more complex and baffling than the physical. This is largely due to the fact that it is a dynamic factor rather than a static. As we have seen, the world has always been essentially the same at every stage of man's development. Man makes certain superficial alterations in earthly conditions—much of the carbon is no longer in the form of forest trees or coal deposits, much of the iron is now rust instead of ore, much of the crude oil has been blown out as noxious gases from the exhaust pipes of automobiles—but on the whole man leaves the world very much as he found it. All he needs to do is to learn about the world, and the knowledge holds good. But the human environment has been built up from nothing to its present proportions during the space of man's own existence. Every change in the physiological features of the human being, every additional convolution in his gray mat-

ter, every invention and discovery, every new institution, every advance in the mastery of nature itself has had its repercussion on the human environment. As fast as adaptations were made new adaptations were required. As a consequence, man's adaptation to his human environment has never been very accurate, and at the present time the maladjustments are glaring. We know a good deal more about the organization of industry than we do about the organization of society. We know a good deal better how to produce wealth than we do about how to distribute and use it. We understand much better how to control the forces of nature than the forces of the human heart.

Within very recent years the menace and the anomaly of this situation have become so obvious that men have begun to ask whether it may not be possible to achieve the same mastery over the human environment that we have over the physical environment. The query has been raised whether the methods that have proved so useful in learning about the material world may not be applied with equal success to learning about social man. In short, can there be such a thing as a science of society? Or at least, can the scientific method be applied to the study of social relations?

Sociological Phenomena

What are the phenomena of the human environment? They are the facts that arise from the association of human beings in groups. Robinson Crusoe alone on his island provides no material for sociological research. As soon as his man Friday appears a human environment is created, social relations are established, and the phenomena of social

science emerge. In more familiar terms, the phenomena of social study are the relations of parents with children, neighbor with neighbor, teacher with pupil, citizen with government, buyer with seller, producer with consumer, employer with employe, movie actress with movie patron, baseball player with umpire, and both with the fan, and so on down a list much too long even to epitomize, but in general familiar enough to us all. Some of these relationships are involuntary and inevitable, such as the relation of the child to its mother. Some are voluntary and deliberate, such as that of man to wife. Some are of long duration, like the ties of family. Some are very brief, like that of the purchaser of an ice-cream cone to the drug clerk. The importance, however, is by no means proportionate to the duration. One of the briefest of all common social relations is that between the drivers of two automobiles approaching each other at high speed on a public road. Neither has ever seen the other before, and they may never meet again. It is all over in the fraction of a minute, but all the potentialities of life and death are there, and the element of sociality is distinctly prominent.

The phenomena, then, are abundant and definite. They are also capable of observation and record. Some of them are so simple and routine in character that they can be observed and recorded by a mechanical device. The subway turnstile that counts the nickels dropped into its voracious and insatiable slot is observing and recording sociological phenomena. Most of them, of course, are much more complex and elusive, and require

the attention of a competent human observer. The qualifications of the sociological research worker are much the same as those in any other field, but they are much more difficult to achieve. The pitfalls of bias, prejudice, and personal interest are much deeper, more numerous, and deceptive than in any of the physical sciences. Theoretically, however, the accumulation of sociological facts is perfectly possible, and practically quite reliable data are continually being amassed.

The next step, classification, is also perfectly possible. The one requirement is a logical and consistent basis. There are plenty of good classifications of sociological data in existence, and also some very bad ones, the most notorious, probably, being the classification of socially inadequate individuals into "Dependents, Defectives, and Delinquents," which rests on no comprehensible basis whatever, with the result that a given individual not only may be, but very frequently is, a member of each group—dependent, defective, and delinquent.

Difficulties begin to arise when we approach the stages of interpretation and generalization. Interpretation is difficult in the first place because of the persistent intrusion of the personal element. We all see sociological facts through a glass, darkly—the glass of our own experiences, interests, and predilections. But setting this difficulty aside, sociological interpretation presents peculiar obstacles to even the most detached and impersonal student. These are due, in the first place, to the very abundance of the data. It is hard to see the woods for the trees. Seldom can any student review all the data on a question, and then he is never sure

that what he sees are representative. A second difficulty lies in the familiarity of the data. Every individual starts collecting sociological data from the moment that he is able to think at all, and he continues to collect them as long as he lives. By the time any one of us is twenty-one he has made more sociological observations than he will probably make in any physical science he may choose, even though he devote the rest of his life to it. So we are overwhelmed with material, and have difficulty in deciding what is significant and what is not.

Sociology as a Science

It is often said that sociology can not be a science because it offers no possibility of experimentation. It is true that most of the essentials of experimentation—the control of the conditions, the possibility of repetition with identical factors, of repetition with one after another of the separate factors eliminated, of variations in proportions, etc.—are absent in social relations. It is also true that the lack of experimentation is a serious handicap to the establishment of a science. But it is not an insuperable impediment. Astronomy is one of the most exact of all the sciences, yet it allows no experimentation at all. If the phenomena are constant and capable of observation, there can be a science. It follows that if sociology can not be a science it must be either because the phenomena are not constant or because they are not capable of observation. We have seen that they are capable of observation, so the difficulty must lie, if at all, with their constancy.

This is really the crux of the whole problem, and re-

quires careful consideration. Let us inquire, first of all, whether there are any every-day, commonplace evidences of the regularity of sociological phenomena. In doing so we must take the precaution of avoiding the illusion of the familiar, already alluded to. We must not make the easy mistake of supposing that we are to look for something spectacular, unusual, or phenomenal in the narrow sense of the word. In the physical sciences it is precisely repetition that gives confidence, and so it must be in social science. The more frequently a thing occurs the more significant it is. Once this point is grasped, the whole situation takes on a new aspect. The routine events of every day life, all those sociological observations that we have repeated a dozen times a day every day of our lives, suddenly become significant and relevant. Your cook gets up nearly on time and gets you a reasonably good breakfast. You slip down one of the "rabbit-holes" on the sidewalks of New York and in two or three minutes take a subway train in either direction. You buy your favorite morning paper for two cents. You ask a question of a policeman and get a measurably civil answer. You absentmindedly step in front of a moving motor car and the driver jams on his brakes. You see a couple of men looking up earnestly at some undetermined point on a tall skyscraper and you join the rapidly growing crowd all craning their necks in the same direction. You pick up the telephone, take the receiver off the hook, and within a not-too-protracted time somebody at the other end says, "Number, please?" You stick

Social Regularity

a two-cent stamp on an envelope, drop it in the box, and expect an answer within three days. Continue, *ad libitum*. The surprise or irritation with which you greet any deviation from the expected in any of these particulars is the best possible evidence of their regularity. "But," some one may say, "these are all trivial and inconsequential affairs. Show us something important." Stop and think. Is it trivial that when your child is suddenly taken ill, someone at the other end of the telephone wire says "Number, please?" and connects you with the doctor? Is it inconsequential that when you are hurrying to an important business appointment at the other end of the city you can catch a subway train in two minutes? Is it of no moment that when your wits desert you for a moment the brakes of the automobile go on with a shriek? No, these things are not trivial. They only seem so because we take them for granted, and we take them for granted because they are regular. As well say that the law of gravitation is trivial because a thousand raindrops fall on your umbrella in a minute.

Predictability

Such facts as these dispose once and for all of the charge so often repeated that sociology can not lay claim to the name of science because it offers no predictability. Once you stop to think of it you realize that the whole routine of our daily lives is based upon the predictabiilty of social affairs. Even in exceptional events and emergencies there are certain fundamentals that we count upon with absolute certainty. You know that if your house catches fire, not only will the paid fire fighters rush to the scene,

but a host of volunteers will appear ready to do anything in their power. You know that in the case of a serious train wreck every available doctor in the neighborhood stands ready to offer his aid with no thought of compensation.

On the sixteenth day of October, 1924, the newspapers announced the successful completion of two great scientific ventures. Both were unique. Nothing exactly similar to either had ever been tried before. One was a venture in physical science, the other a venture in social science. The first was the floating of a German airship over the Atlantic; the second was the floating of a German loan. If you had been asked to risk your reputation by predicting the outcome of one or the other, you would have done wisely to select the sociological venture rather than the physical. The bankers knew (as the word is commonly used) that the German loan would go over. Nobody knew that the ZR3 would get across.

Nevertheless, we cannot escape the feeling that in most unprecedented ventures it is possible to arrive at a much greater degree of advance certainty in the realm of physical science than of social. As I write, they are talking about a 110-story office building in New York. Nothing like it has ever been built. Yet the engineers are certain that it can be done, and know just how to go about it. Such a venture has its sociological aspects also. Experts are already predicting how many people will use the building and how much of a burden it will lay upon the subway system. But there is a great deal more exactness about the specifications of the building

than about the estimates of the number of people that will travel up and down in its elevators. Some years ago the Erie Canal was enlarged at great expense. The engineering features were matters of definite prearrangement, but the use that people would make of it was a matter of great uncertainty and in the event proved very disappointing. The astronomers can predict an eclipse of the sun hundreds of years in advance, and are greatly perturbed if the moon arrives a second or two late. But who will venture to say whether democracy will suffer an eclipse within the next century? The scientists could foretell at just what moment New York would be able to telephone to London, but who dares to forecast the date when the United States will join the League of Nations. We know beyond a doubt that oil promotes the efficiency of machinery, but all the arguments of all the economists have not yet demonstrated whether free trade would promote the prosperity of the United States.

We have seen that the character of natural forces rests upon the qualities of the ultimate particles of matter, and that the possibility of natural laws rests upon the constancy of the qualities of matter. What is the ultimate particle in the sociological material? Is there anything in human society corresponding to the atom? If so, what are its qualities, and are they constant?

Sociological Atoms

It would be idle to suggest that the ultimate particles of sociological material are the same as those of the material of physical science, or even that they are identical in character. If they were, there would be no such thing as distinct

social science. But there is, when we come to look at it, a remarkable similarity or analogy between the two. The ultimate particles of the sociological material—the sociological "atoms"—are individual human beings, men, women, and children. Sociological phenomena arise out of the qualities of these units just as the phenomena of physical science arise out of the qualities of the atoms. The science of chemistry is based upon the way the atom of oxygen acts, under certain conditions, in the presence of atoms of hydrogen, upon what an atom of zinc does in the presence of a molecule of hydrochloric acid. The science of physics rests upon the way a filament of tungsten acts, under certain conditions, in response to a current of electricity, upon what a piece of lead does when released a certain distance above the earth's surface. So social science, if its exists, must rest upon the way a child acts in the presence of a broken toy, the way a wage earner acts, under certain circumstances, in the presence of his employer, the way an adult acts, under a variety of conditions, in the presence of a person of the opposite sex, the response that a law-abiding citizen makes to the impact of a mob, and so on. The act in every case, in physical and social science alike, is dependent upon the conditions, though determined by the qualities of the material in question. If, in social science, the conditions are almost always very complicated, never exactly identical, and unusually incapable of experimental control, this does not mean that sociology cannot be a science; it simply means that it must be a very difficult science.

Qualities of Human Atoms

The final question, once more, is whether the qualities of the human atom—sometimes called by the atrocious name of "socius"—are constant. Constancy, in this connection, means two things. It means first, that the qualities of the individual unit remain permanently the same, just as the qualities of a given atom of iodine are believed to be the same yesterday, today, and forever. It means in the second place, that the qualities of all the separate atoms of a given type are exactly identical, just as every atom of gold is precisely like every other atom of gold in its behavior. Stated in this way, the analogy between social and physical science seems to vanish immediately into thin air. We need no scientific research to tell us that neither is the individual the same throughout his whole life, nor are any two individuals—not to mention the whole mass of them—identical. There was a once-popular comic opera, one of the songs of which had a verse that ran something like this: *

> But you never can tell about the women.
> Perhaps that's why we think they're all so nice.
> You never see two alike any one time,
> And you never see one alike twice.

There are times when we feel that this is a perfect characterization of the whole human race.

There is a still more serious discrepancy between the material atom and the human individual. The final par-

* Or, as Vergil puts it, "Varium et mutabile semper femina."

ticles dealt with in physical science are believed to be indestructible. The same identical atoms appear over and over again in physical phenomena throughout the ages. The handle of the hammer that you use in your carpentry work may contain some of the very particles of carbon that were in the first stick bound on to a stone to make the original progenitor of all hammers. But we know it is far otherwise with the human atoms. The particles of sociological material are renewed every few years—the Biblical limit of four-score years is not exceeded in any large proportion of cases—and they are renewed in constantly changing form. Throughout the preceding pages emphasis has continually been laid on the progressive changes in human nature itself.

It seems indisputable, therefore, that if sociology is a science at all, it is a very different kind of science from physics, chemistry, or astronomy. But let us consider a little further.

The only qualities of matter that are significant with respect to any given science are those that produce phenomena within the field of that science. Thus the qualities of weight (in the ordinary sense), volume, color, taste, smell, hardness, etc., are not important to the science of chemistry, but the qualities of atomic weight, chemical affinity, valence, etc., are important. So the only qualities of human beings that are important to social science are those that produce sociological phenomena. What then, are sociological phenomena, and from what human qualities do they arise?

Sociological phenomena are the acts of human beings. But they are not necessarily all the acts of human be-

Sociological Phenomena

ings. In order to be a sociological phenomenon the act of a human individual must in some way or other affect at least one other human being. In theory this is not the case with all acts. It is possible to conceive of acts the influence of which begins and ends with the individual who performs them. If you are walking alone through the woods and a twig suddenly falls before your face you involuntarily wink your eye. This is not a social fact. But in the presence of other persons a deliberate wink of the eye may have very high social significance.

Such acts, however, must in real life be relatively very few. It is a rare act, however complete the isolation in which it is performed, that does not have some effect upon the health, character, disposition, or interests of the individual in question, and so affect those who are dependent on him or interested in him. For practical purposes it is scarcely necessary to attempt to segregate social from non-social behavior. Virtually all human conduct may be considered to have its social implications.

The question of social phenomena is therefore essentially the question of human behavior. To understand the nature of social phenomena it is necessary to understand human behavior. For this insight we are obviously dependent upon the psychologists, who unfortunately have by no means reached a complete agreement among themselves. However, certain fundamentals have been established beyond any reasonable doubt. As a starting point, since man is an animal, it will be helpful to inquire how animals behave.

Most of us, asked to explain the nature of animal behavior, fall back on the one word "instinct." It must be confessed, to speak bluntly, that the specialists do not seem to have gone much further. For the word itself is used to cover the behavior of animals when there is nothing higher. There are excellent books on the subject, as, for instance, Professor L. L. Bernard's book "Instinct," and one can profitably spend considerable time studying them. What we learn, reduced to its simplest terms, seems to be something like this: From the point of view of behavior, the body of an animal contains four different types of tissue. The first, partly external and partly internal, receives impressions or stimuli, and is called the "receptors." The second transmits these impressions to a central organ. The transmitting tissue is called "nerves," and the central organ, closely connected with the nerves and scarcely differentiated from them in very low animal forms, is called a "ganglion" or "brain." In the ganglion or brain the message is transformed into an order and passes once more through the nervous tissue to the muscular or "effector" system where it is transmuted into action. The lower the form of animal life, the less significant is the mediation that takes place in the central organ. In the simplest form of animal behavior, and in all forms of plant behavior, it is believed that the whole process between the receipt of the stimulus and the action is automatic, that is, it is predetermined by the nature of the organism itself. Given a certain organism, and given a certain stimulus, a certain action

Animal Behavior

must result. Elementary acts of this kind are called "tropisms" or turnings. Familiar examples are furnished by various flowers, and sometimes immortalized in song:

> "As the sunflower turns to her god when he sets
> The same look which she turned when he rose!"

Most plants turn toward the light. A morning-glory plant will turn toward a stick set in the ground several inches from its furthest tendril, and will follow the stick around as it is moved from time to time. A little higher in the scale of behavior, comes the "reflex," which is also automatic. Familiar examples are the knee-jerk beloved of physicians, and the eye-wink that follows a sudden movement toward the face. And a little higher still comes instinct, though it is difficult to detect what the line of demarcation is. True instinctive behavior, it would seem, is just as automatic and predetermined as tropisms or reflexes. An instinct, as sometimes defined, appears to be a combination of sense organs, nerves, central control organ, and muscles, existing in a certain organism, of such a sort that when a given stimulus is received a given type of behavior must and does follow. Many apparent instincts are very complex and produce very intricate and beautiful results, such as the nest-building instincts of birds, the web-spinning instincts of spiders, and the cell-building, honey-storing instincts of bees. Bergson, in his engrossing book "Creative Evolution" gives some remarkable examples.

"We know that the different species of hymenoptera that have this paralyzing instinct lay their eggs in

spiders, beetles or caterpillars, which, having first been subjected by the wasp to a skilful surgical operation, will go on living motionless a certain number of days, and thus provide the larvæ with fresh meat. . . . The Scolia, which attacks a larva of the rose-beetle, stings it in one point only, but in this point the motor ganglia are concentrated, and those ganglia alone: the stinging of other ganglia might cause death and putrefaction, which it must avoid. The yellow-winged Sphex, which has chosen the cricket for its victim, knows that the cricket has three nerve-centers which serve its three pairs of legs—or at least it acts as if it knew this. It stings the insect first under the neck, then behind the prothorax, and then where the thorax joins the abdomen. The Ammophila Hirsuta gives nine successive strokes of its sting upon nine nerve-centers of its caterpillar, and then seizes the head and squeezes it in its mandibles, enough to cause paralysis without death." [21]

If you are fortunate enough to detect some "mud-dauber wasps" in the act of building their cell you can witness an equally marvellous performance. You can see them bringing little pellets of moist clay that they have found somewhere and worked up into the proper consistency, and, with incredible speed and dexterity, building them up into the successive arched tiers of which the cell is composed. Eventually the cell will be completed all except a small opening. Then you will see them bringing spiders that they have paralyzed in the way described by Bergson, which they will store in the cell. In these bodies the eggs will be laid and incubated,

until finally they hatch out, when the little larvæ find a store of choice food all ready for them.

Instinctive Determinism

But however complicated and intricate its behavior, the animal that is governed solely by instinct is wholly a creature of circumstance. He has no recourse but to yield to the present stimulus, or if there are several present, to the strongest stimulus. If there happen to be two contradictory stimuli of equal strength, he is unable to act at all, as is illustrated in the classic example of the ass, placed at exactly the middle point between two equally attractive haystacks, who forthwith starved to death because he could not move in either direction. If there are several stimuli working in different directions, his behavior corresponds to a parallelogram of forces. In other words, for such an animal under a given set of circumstances only one line of conduct is possible, which means, of course, that its whole career is predetermined.

It must not be supposed that instinctive behavior is necessarily the same under given circumstances throughout the lifetime of a given organism. Growth in the organism may modify the physiological equipment and so modify the response. Furthermore, the performance and repetition of an act may itself modify the physiological equipment, and so affect the nature of the response under future stimulation. This is essentially what is meant by habit formation. What is known as a conditioned response may result from an association of stimuli. So animals have something which may fairly be considered rudimentary memory, and can, in a very real sense, learn by experience.

How, then, does human behavior differ from that of the infra-human animals? The old answer was a very simple one—"Through the agency of free will." Even as recently as 1917 Professor MacIver, one of the most penetrating students of social affairs, could say, "Wherever living beings enter into, or maintain willed relations with one another, there society exists. All such willed relations are the primary social facts," [22] thus making will an essential feature of sociological phenomena. The problem of the freedom of the human will has probably been the chief storm center of all philosophical and psychological controversy in the past. In the days of religious domination of thought it took the form of asking how man can be free when God is omnipotent. One answer was given in the doctrine of predestination, expressed in many religious formulas which are no longer accepted even by those who give them lip-adherence.

> Father, I know that all my life
> Is portioned out for me;
> The changes that are sure to come,
> I do not ask to see.

Today the ground has shifted. The question now is, How can man be conceived to act freely in the light of what is scientifically known about the physiological basis of behavior and the nature of stimulation and response?

There can be no doubt that the human equipment for behavior does not differ fundamentally from that of

the higher infra-human animals. There are the same four types of tissue by which stimuli are received and transmitted to a mediating organ from which an impulse proceeds to the motor system. Put in a nut-shell, the significant difference between human and non-human behavior depends upon what takes place in the mediating organ, the brain. Here are located certain qualities, seemingly unique in the human species at least in the degree of their development. It is no longer customary among most psychologist to include in these qualities anything corresponding to will in the old sense. What is included is the ability to visualize in advance the consequences of action, and thus to set up mental images, conditioned of course by memory and experience, which themselves serve as stimuli and help to determine conduct. To conduct of the human type we may, for convenience, give the name "super-instinctive" behavior.

Human Behavior

The chain of causation in simple instinctive behavior may be summarized somewhat as follows:

Stimulus
Feeling
Impulse
Action

Human behavior starts in much the same way. But a modification soon appears. In the first place, simple feeling becomes almost immediately transmuted into desire, that is, it acquires an element of consciousness, and also of objective or end. Much more important, however, is the change introduced by this group of qualities

or processes which are believed to be exclusive to man. The human chain of causation may be represented something like this:

Stimulus
Feeling-Desire
Motive
- Foresight
- Forethought
- Reason
- Deliberation
- Choice

Decision
Action

Foresight

In the process of human behavior the element of foresight and forethought holds an eminent place. So far as we know it is entirely lacking in instinctive behavior, and almost entirely absent in the conduct of all infra-human species. Animals when guided by instinct are presumably entirely unaware of the consequences of their conduct. The end of the act is not a factor in their behavior in the least. The stimulus is everything. But man can foresee the outcome of his behavior. He can therefore compare several different lines of behavior on the basis of their outcome.

In modern psychological thought this does not in the least open the door to free will. It simply means that man responds to a much wider and in many respects different variety of stimuli than the other animals. Judgment is the process of making a comparative evaluation of the various stimuli and good judgment is a matter of accuracy in assigning each image its proper relative

weight. Super-instinctive behavior is characteristically forward-looking behavior. It is based on images that exist in the present but have reference to consequences which will emerge in the future.

Current Beliefs

It is obvious enough that this conception of conduct has not yet deeply penetrated the mentality of the average sociological atom nor widely affected social procedure. The assumption of free will still permeates most social relations. The notion of "culpability" or "blame," in the sense of something much more than mere objective agency, still governs a large part of our relations with each other. "You ought not to have done it" still means something very different from "It would have been better for your group if you had not done it." A simple example will illustrate this point. Into a city police court, some morning, two officers bring two alleged culprits. The judge turns to Officer O'Brien, and asks what is the charge against his captive. He is told that it is assault, committed on the subway. The judge then asks the prisoner to tell his story, which is as follows: "I was coming down on the subway this morning, and the car was crowded. I reached up to take hold of the strap and just at that moment the train struck a curve, the car lurched, and I was thrown forward. My fist struck the chin of the man next to me. It was a force over which I had no control; I simply could not help it." Further inquiry substantiates the story, and the judge turns to the accused, saying, "All right. You can go. Try to be more careful next time." Officer Finnegan is then asked to state his case. He replies, "It's a strange coincidence,

judge, but my man is charged with exactly the same offense." Asked to tell his story, prisoner number two relates, "You see, judge, it was this way. I just can't stand a lavender necktie. It's something in me that I can't control. Now on the subway this morning there was a man with a gaudy lavender tie, and do you know my fist just came up and hit him on the chin. I simply couldn't help it." "It's time you learned to help it," snaps the judge. "Thirty dollars or thirty days." It is perfectly clear that in the judge's mind these two cases represent fundamentally different kinds of conduct, and ninety-nine out of a hundred of the onlookers concur in his view. "Getting what one deserves" is a very definite thing in the minds of most people.

The point of this discussion is to emphasize the fact that a *belief* in free will, so long as it exists, is in itself a social force, and must be taken account of in social interpretation, however mistaken scientific investigation may prove it to be. Scientific social engineers will devise measures based on what scientific psychologists tell them is the nature of human conduct; but neither can ignore the existence of widely prevalent errors, whether they be myths, superstitions, or outworn psychological theories.

Mode of Control

Fortunately, the complete abandonment of the doctrine of free will does not involve so much modification in either social theory or social practice as might at first thought seem necessary. In attempting to understand human behavior, instead of asking why people *will* to act thus and so, we ask the much simpler question, what kinds of stimuli pro-

duce such and such kinds of conduct. And society, in its great task of social control, instead of seeking to *persuade* individuals to choose sanctioned forms of conduct, devotes its energies to providing stimuli which will produce the desired forms of response. Social responsibility loses its implication of a freely acting independent agency and takes on the much more tangible and objective aspect of adjustment to a given human environment. Social measures which in the past, on whatever theory, have proved practically effective may be considered to that extent to have justified themselves as well-chosen and appropriate forms of stimulation. Definite appeals to the will, on the other hand, which have proved futile may be abandoned with good grace.

Underlying this super-instinctive behavior characteristic of man, there undoubtedly still remains a vast substratum of true instincts. Their manifestation is seldom simple, and in the adult they are very highly conditioned, but their influence should never be lost sight of. And underlying instinctive behavior there are, of course, chemical reactions, and back of those, physical phenomena. There is no sharp break in the nature of motion from the fall of a dead leaf to the playing of a Kreisler. But the task of comprehension is facilitated by making certain more or less arbitrary divisions. Accordingly, sociological movement includes only that which springs from super-instinctive impulses.

Interests

For our purposes, then, we may think of a human act as beginning with a feeling which is scarcely distinguishable from the desire that arises out of it; it becomes strictly sociological

only on the level of desire. As we have seen, there is an element of consciousness and anticipation about a desire that distinguishes it from a simple impulse. A desire looks forward to an end or object. The object is something calculated to gratify the desire or satisfy the feeling. At one end of every human act, accordingly, there is a desire and at the other end an object. The resulting relation is one of the most important concepts in social science. It is what we call an "interest." An interest may be defined as the relation that exists between an individual and an object which he believes will gratify a desire of his. This object may be a material thing or an act. A hungry man has an interest in beefsteak, a vengeful man has an interest in a revolver, a sleepy man has an interest in a bed; on the other hand, an enthusiastic football rooter has an interest in shouting, an active child has an interest in running and jumping, a healthy flapper has an interest in dancing. Anything that will satisfy any desire may be the object of an interest.

Dominance of Belief

You may have noted that the word "believe" occurs in the definition just given. It emphatically belongs there. That is one reason why so much stress was laid on belief in earlier passages. All distinctly human action, everything that is comprised in sociological phenomena, is forward-looking action. It deals with the future, not with the past or even the present. It is therefore based exclusively upon belief, not on knowledge. The belief may be based on knowledge, and usually is to a greater or less extent. To a large extent,

also, our beliefs are social products, that is, they are based on the experiences and consequent beliefs of other individuals with whom we come in contact. The intercommunication of beliefs is a very important social process. But action itself is based on belief. This fact has been recognized by penetrating thinkers for ages past. "As an old Stoic proverb has it, men are tormented by the opinions they have of things, rather than by the things themselves." [23] "Not the facts, but men's opinions about the facts, are what matter." [24] The tragic feature of the whole situation—one of the penalties of intelligence—is that belief governs with equal authority whether it be true or false. Belief is no less determinative of conduct, when it is purely visionary than when it is sound, that is, in accordance with facts. So our interests fix upon objects entirely in accordance with our belief as to their capacity to gratify desires, not necessarily in accordance with their inherent qualities. The colonial housewife in Connecticut had exactly the same interest in a wooden nutmeg, while the bargain was being concluded, that she would have had in a genuine one. A string of synthetic pearls, or a tiara of paste jewels, brings the same glow of pride to the cheek of the wearer as a gem of the first water as long as the truth lies hidden. Thirty-seven million immigrants have come from Europe to America animated by the belief that they would find freedom, wealth, or some form of prosperity here. In a majority of cases, presumably, the belief has proved sound; in a pitifully large minority it has turned out wholly illusive. But action resulted as inevitably in one case as the other.

It is doubtful whether we can possibly help having beliefs, or possibly avoid acting on the beliefs that we have. This is where predetermination comes in, it would seem, if anywhere. We may have a mental equipment that helps us to control and modify our beliefs. But once beliefs are established in our minds it is questionable if we can resist them. In this connection we must remember that refusing to act is action just as much as what ordinarily passes by the name. The man who says in regard to a certain proposition, "I am not going to do anything about it," already has his belief and is acting upon it.

So if there is regularity in human conduct it must be because there is consistency in belief. Now the beliefs that are germane to social science are the beliefs that create interests. And interests have at one end desires and feelings. So now we come to the first solid rock upon which we may be sure social regularity rests. The feelings of all human beings are basically similar, not to say identical, and so, accordingly, are the desires associated with them. Men, as we have observed, are far more alike than they are different. Let us examine some of these fundamental desires.

Regularity of Desires

First and foremost comes the desire for food, associated with the feeling we call hunger. This is universal to all human beings. It is clearly a product of natural selection. It is one of the qualities inexorably required by every earthly environment. Any individual who lacked it would inevitably and summarily be eliminated. Here, then,

Hunger

is the first constant factor in all social atoms—the human individual invariably desires food.

The second great and universal desire is the mating impulse, often called sex-hunger. This is also a product of natural selection. It is not necessary for the survival of the individual, but it is for the perpetuation of the species. Sex-hunger bears the same relation to mankind that food-hunger does to man. But since it is not requisite to the existence of the individual, it does not necessarily exist in all individuals. We cannot therefore make our generalization in this case quite so sweeping. We can simply say, the mating impulse exists in almost all social atoms, and invariably in enough of the atoms of any human mass to provide for the continuation of the mass.

Mating Impulse

The third basic desire is what, for want of a better word, we call "vanity." In more explicit terms, it is the desire for a good opinion of oneself. This is a quality that has only recently received the consideration it deserves, and is consequently still much misunderstood. One of the earliest thinkers to give it its proper setting was Professor Sumner. A more recent writer has stated, "The true motive of nearly all our actions is love of approbation," and appends an excellent discussion of the rôle of vanity.[25] For the fullest exposition of this motive we are indebted to Alfred Adler. But the word vanity, from its everyday use, has such a definite meaning, and this meaning is so different from its sociological connotation, that particular attention must be devoted to

Vanity

it. Vanity, in common parlance, indicates a state of mind. A vain person is one who thinks well of himself. Vanity, in the sociological sense, is a *desire* for a state of mind. The two things are as different as the opposite poles. A man may desire a good opinion of himself never so eagerly and yet may in point of fact have a very poor opinion of himself. In other words, a man with very great vanity in the sociological sense may be a very modest and humble man in the everyday sense. Furthermore, in the sociological sense vanity is nothing unworthy or undesirable; on the contrary, it is one of the most admirable and useful of human traits, and really indispensable to the orderly functioning of a complex society. The word "pride," as commonly used, comes nearer to suggesting this desirable quality than vanity.

The human atom is so constituted that one of the foremost elements in his opinion of himself is his belief in the opinion that others have of him. A desire for a good opinion of one's self, therefore, becomes to a very large extent a desire for the approbation of one's group. It involves every phase of yearning for recognition and response. It reaches at one extreme deep down into the primitive gregarious instinct of the herd, and at the other aspires to the loftiest plaudits of a conscious and critical audience.

So defined, there can be little doubt that vanity is fully as universal among social units and just as powerful a factor in social phenomena as hunger, and more widespread and potent than love.

These are the three basic desires that by general

agreement of psychologists, exist in so nearly the totality of social atoms as to furnish constants at one end of the interest nexus. Let us therefore turn for a moment to what we find at the other end.

Starting with hunger and following the interest to its other extreme, what do we find? Food. And what is food? Very much the same thing for all social atoms—material substances of certain general types obtainable only from the earth. The basic types are two, vegetable tissue and animal tissue, with an infinitesimal third, mineral salts not supplied by animal or vegetable matter. These foods can be secured only from the earth and only by effort. The forms this effort take are collection, hunting (including, of course, fishing), stock raising, and agriculture. None of these methods is capable of expansion so as to produce unlimited supplies.

Termini of Interests

Lo and behold! we already have several sociological generalizations that are perfectly sound. Men desire food. Food comes only from the earth. The earth can not be made to produce an unlimited supply of food. "Trivial and platitudinous," you say? By no means. They are, in point of fact, forgotten or ignored in two-thirds of the discussions of so important a social question as population.

In this case we have constants that inhere in the human atom at one end tying up through the interest nexus with constants that inhere in physical atoms at the other end. Certainly an admirable basis for generalization and possible law!

Consider now the second great constant, love. At

the other end of the love nexus is, not a material constant, but another social constant. Other generalizations ensue. Human atoms desire mating with those of the opposite sex. This requires sexual union. Hence men and women will strive for sexual unions and achieve them if possible. Commonplace, indeed, but certainly not trivial.

Take the third constant. Men seek approval, recognition, response. These can be secured only from the group, and only in return for certain types of conduct. Men will therefore strive to perform those kinds of conduct that will bring approbation and a sense of self-gratification. Societies will be able to control individuals by appeals to this eager craving. At one end of the vanity nexus man, at the other end society. Result, some of the profoundest practical generalizations that serve to hold modern societies together.

There are, accordingly, three primary groups of interests with respect to which virtually all human individuals display similar, often largely identical, conduct. At one end of each of these interests is the individual. At the other end of the first is the earth, of the second is another individual, and of the third is society. With reference to them all numerous deeply significant generalizations are possible.

These instances will suffice to demonstrate that in the social atoms there are enough constants to produce at least some regularity in social phenomena. And where there is some regularity there can be some law and therefore some science. How much more of social

science there may be than is already indicated will perhaps become more evident as we go on.

A dynamic constant is a force. Dynamic constants acting consistently and uniformly constitute *the forces* of a field of science. The descriptions, and so far as possible the explanations, of the behavior of these forces constitute the laws of that science.

Social Forces

The dynamic constants of sociology are the desires of human individuals. These desires act with sufficient consistency and uniformity to constitute social forces. The basic objects of desire are also constants. Consequently the pursuit of interests produces regular social phenomena which can be expressed in sociological laws.

The primary difference between these sociological laws and the laws of physical science is that the former contain a larger element of probability than the latter. This is purely a matter of degree, and not sufficiently extreme degree to produce a virtual difference in kind.

Probability

This difference in the degree of probability is traceable, of course, to a greater variability, or a lesser constancy, in the atoms of social material than of physical material. There can be no denying that human individuals do not behave, under identical conditions, with the same uniformity that material atoms do. The social unit is notoriously inconstant and capricious. Consequently, it is quite impossible to predict the behavior of individuals with the same certainty as the behavior of atoms. It is possible, that if all the conditions and factors could

be known, much of this seeming variability would disappear even in individual human behavior. Predictability is possible in physical science only if all the factors are known. But in social science it is never possible to know all the factors. As a result, few of the predictions and laws of social science are applicable to individuals but only to groups. The larger the group, as a rule, the higher the degree of predictability, and the more inflexible the law. This is another respect in which social science differs from physical.

Mind a Variable

There remains a third, and even more important, basis of difference. The part of the human being that is significant for sociology is the mind. The constants of social phenomena are qualities of the mind. But the human mind itself is not a constant. It is a perpetual variable. It varies in the first place by a process of actual organic evolution. The physical constitution of the modern brain itself is very different from that of Pithecanthropus Erectus. Whether this evolution is still going on, or whether it stopped some thousands of years ago, we can not be absolutely sure. But there is another sort of change that certainly has not stopped. This is the change produced by the human environment itself. The mind of man, as a functioning agent, at any given time is the product of its inherited character plus the totality of its experience up to date. The experience is partly a matter of individual career, but very largely a matter of the social surroundings in which it has been forced to operate. The human mind is always in the making, and it is made very largely by the human environment.

Exactly the same innate mind would be a very different kind of an agent in the Court of King Arthur and the Cabinet of President Coolidge. Since the human environment is always changing, the functioning mind must also be always developing. The constants of the social unit are not constants chronologically. As LeBon [26] points out, every people, and as Spengler [27] demonstrates, every culture, has its own soul. Consequently, social science rests upon a foundation which is itself shifting. This gives social science a time element that physical science entirely lacks. Social science is itself dynamic, in every department.

Every sociological generalization ought to be dated. This is perhaps the most salient difference between social science and physical science.

Our final conclusion must be, then, that social science is a very different kind of a science from physical science. But there can scarcely remain any doubt that it is a science.

CHAPTER VII

GROUPS

It has already been suggested that sociology centers upon the group. What is a human group? What different kinds of groups are there? How have they come into existence? How do they function?

The group organization of mankind is a familiar commonplace—one of the things we take for granted and seldom dwell upon. Numerous terms are in everyday use to indicate different kinds of groups—nation, people, society, association, community, not to mention such more artificial bodies as the congregation, party, club, lodge, etc. But while familiar, group realities are so important that an understanding of them is absolutely necessary to any comprehension of the modern situation of mankind.

A group is a number of human beings bound together into a more or less closely knit organic unit by some sort of ties. In some respect or other they must function more unitedly, or feel more coherently, with each other than they do with outside persons. There is a great diversity of these ties.

Geographical

The primary basis of group unity is probably geographical. The mere fact of living together on the same section of the earth's surface sets up relationships between men that do not exist otherwise. They of necessity impinge upon

each other, jostle each other, compete with each other, interfere with each other, help each other. This type of grouping, as has been pointed out, was the inevitable consequence of the process of dispersion. Human aggregates became established in the various habitation districts of the world. For long periods they were more or less effectually segregated from each other. Willy nilly they had to establish contacts with each other. So today geographical contiguity is sometimes the essential factor in a group organization, and very frequently is a contributing factor to groups organized primarily on some other basis.

Racial

The second basis of group unity is unquestionably race. This factor, as we have seen, is also the product of the process of dispersion. Its rôle has been a powerful and enduring one, and is by no means yet played out. Unfortunately for purposes of analysis, its significance has become very much confused. As has been shown, following upon the period of dispersion, which was an era of race formation, there came the period of migration, which was an era of race contact and consequently race mixture. Migration has taken various distinct forms, invasion, conquest, colonization, and immigration, but its general effect has been very thoroughly to intermingle the races with each other. Race can no longer be identified with geographical location. In the older areas of human settlement where the period of dispersion came to an end first there have been numerous shiftings of population. In the newer areas of settlement there is still some meaning to the term aborigine. In spite of

it all, however, racial realities still persist. Race traits, being in the germ plasm, are exceedingly tenacious, and the race feeling that goes with them will not down.

The question is often raised whether the process of race formation has come to an end, or whether racial traits are still being developed otherwise than by mixture. It is a question that can not be answered categorically. Some indication of the probable truth, however, may be gained from considering the process by which races have been formed. If the explanation already given is correct, the races of man are biological varieties of the human species, formed as a result of progressive physical adaptation to diverse environments. The distinctive traits of the races have been selected by their respective areas of characterization on the basis of their survival value. The individuals that possessed them won out over those that did not, in the struggle for existence and in the competition of life. In other words, race traits developed because the races needed them to survive. If the time ever came when men needed no further changes in traits in order to survive, there would be no reason why such changes should occur. There are two good reasons for supposing that this time came many thousands of years ago. In the first place, while natural selection works slowly, it has had, in the case of man, a good many hundreds of thousands of years to work. Sooner or later each area of characterization would have developed the type best suited to its requirements. Adaptation would have been approximately perfect. The type would then have become fixed, and there

would have been no further changes any more than there are in the older species of animals of other kinds. The second reason is that every advance in economic culture, that is, in the reversal of the factor of adaptation (see page 133), made the physical adaptation of the human being that much less necessary. The time came when man could survive, not only in his natural habitat but in almost any other habitat, without any further modifications. There was, therefore, nothing to produce modifications. For the influence of the environment in creating races, it must always be remembered, is a very different thing from the immediate impress of the environment upon the characteristics of a particular individual. The sun of the tropics will still tan a white man, the cold of the arctics will still freeze him, life on a mountain top may make a man hardy, and life in a moist valley make him indolent. Influences such as these may go on forever. But the process of race formation works upon the germ plasm, selecting germinal variations that conduce to survival. When survival is no longer dependent upon variations in the germ plasm, then no such variations will be perpetuated, and the type will remain unchanged.

This theoretical argument is backed up by a considerable amount of factual evidence. All the testimony of history and archæology is to the effect that there has been no perceptible alteration in the characteristics of the principal races for at least several thousands of years past. Ancient paintings on the walls of Egyptian tombs depict races which can easily be identified with those dwelling in the land today. There

is no evidence whatever that three hundred years of residence in temperate America has changed the features of the full-blooded negro in the least. The reasonable conclusion seems to be that race types are permanently fixed in the germ plasm, and can not be expected to change in the future except by mixture, which is of course not change at all.

To operate as a sociological factor, race must impress itself upon the consciousness of the individual, that is, it must affect his social acts. We have already observed that race feeling is a deep-seated and well-nigh universal human sentiment. It is indubitably one of the constants with which social engineers have to deal. There has been much debate of late as to whether or not it is instinctive or at least innate. One of the chief arguments of those who oppose this view rests upon the alleged fact that race feeling does not manifest itself in children, but appears only in later life. This is by no means a conclusive argument, for there are many instinctive reactions that develop only as the development of the individual calls for them, and this may be long after infancy. If innate, it must be somewhat akin to the herd instinct, the more sympathetic reaction to the like than to the unlike, which Professor Giddings has so clearly expounded under the cognomen of "consciousness of kind." As a practical matter, at any given time, it does not make much difference whether race feeling is innate or acquired; as long as it is there it has to be taken account of. It is a function of the mind of social man, and if the product of the human, rather than the physical environment, is

no less real. From the long time point of view, however, it does make a difference. For if innate, it can by no conceivable means be eradicated, while if acquired there is some hope that it can eventually be rooted out by education, exhortation, or some other social means.

As a matter of fact, racial realities are grossly misunderstood. All sorts of things are attributed to race that are not racial at all. Race is regarded on the one hand as much more potent, and on the other as much less potent, than it really is. Much of what is commonly termed racial belongs really to the third category of group unity.

This is cultural. Considerable space has already been devoted to the subject of economic culture. But this is only one part of the great cultural complex. The constant traits that characterize the social units differ widely in their degree of sociality. Hunger is primarily an individualistic trait. It exists in solitude as well as in a crowd. It has to be satisfied whether man lives alone or in a group. The mating impulse is pluralistic, and has little dependence on numbers. The vanity feeling, on the other hand, at least in many of its manifestations, is almost mathematically proportioned to the size of the social group. So there are many other desires that are essentially social. These represent great group needs, and are common to all human groups. The methods of their gratification constitute the great life problems of groups. One of the most insistent and universal of these is the desire for communication. Its solution is

Cultural

language. One of the most illuminating illustrations of the regularity of social phenomena is the fact that no social group has ever existed within the knowledge of man that did not have its language. The need is virtually uniform; the solution is indescribably multifarious. This latter fact illustrates the diversity of social phenomena. But there can be no doubt that language is a necessity for the maintenance of a social group.

Desire to Know

Another universal trait that may be individualistic in its original aspects, but certainly grows under social stimulation and manifests important social implications, is the desire to know. In its rudimentary human form this was probably little more than mere animal curiosity, a tendency to monkey, to manipulate, to make sensual explorations, to ape. But in time it developed into a desire to really get at the nature of things, to find out explanations. In the beginning this desire was presumably largely practical; man desired to know for a purpose. The desire for knowledge for its own sake is a relatively modern development. This desire to know had as one of its earliest objects the phenomena of nature. Primitive man wanted to understand why things befell as they did. The way he worked it out is exceedingly interesting and exceedingly illuminating, illustrating as it does one of the striking similarities between even the primitive and the modern man. We are told that primitive man's logical processes, like those of a child, were essentially logical, granting his premises. His premises were often fantastic, and so he arrived at extraordinary results.

But the pathway over which he traveled to reach them was not so different from that which a modern mind would follow if it started from the same place. One sort of phenomena primitive man could explain with relatively little difficulty, and, as we would say, accurately. These were the phenomena that arose directly from human beings. He did not confuse the issue with any abstruse questionings about free will. If his enemy from across the valley lay in wait for him behind a tree and clubbed him over the head, he was in no doubt about the nature of the phenomenon or its causation. The bump on the back of his head was due to something that his enemy had done, and that was all there was to it. The same direct explanation sufficed for the doings of animals, or of any animate creatures. If he was charged by an angry elephant and had to take quick refuge in a tree, the elephant was accountable for his plight. In short, phenomena that were traceable to an animate agent gave him little trouble, and his explanation was much like ours.

Invisible Causation

His chief difficulty arose in connection with phenomena for which he could detect no visible agent. If the bump on his head was caused, not by a club in the hands of an enemy, but by a dead branch that fell from a tree as he was walking under it, the origin of his injury seemed to him obscure. The war cry of an attacking horde was explicable to him, the crash of thunder was not. As a general rule, primitive man the world over seems to have hit upon a similar type of explanation for what we call the phenomena of nature. For any occurrence

that was not obviously due to a visible agent he predicated an unseen agent. That is, he personified objects in Nature, from which it is but a step to personify Nature itself. He peopled every object which gave any sign of spontaneous movement—still our rule-of-thumb test of life—with some indwelling agent. Space fails us to recount in detail how these invisible agents, spirits in the broad sense of the word, came to occupy a dominant place in primitive man's life, how eventually, perhaps through the experiences of dreams, swooning, etc., the notion arose that there was a spirit, a soul, in his own body. If this story interests you, you can spend some engrossing hours reading Herbert Spencer's version of it.[28] You will be struck by the essential logicality of it all, granting the fundamental idea. The dead branch that raised the bump on his head was hurled at him by the tree, that is, by the spirit in the tree, whose ill will he had incurred in some way. The thunder was the echoing clash of arms in some battle of the gods. The wind was the breath of some mighty spirit blowing good or bad. Out of this idea arose naturally the conception of immortality. A soul that could leave a sleeping body and go off on adventures of its own, could also leave a dead body and continue to exist indefinitely without returning to the body. The next world was naturally a close replica of this world, with the corporeal limitations removed. Spirits naturally fell into two great groups, those that could be identified as the souls of departed acquaintances, ghosts, and those that could not be identified with any human soul, demons. Another two-fold classification was into

the good and the bad spirits, on the basis of their natural attitude toward men. Of the two, the latter required much more attention than the former. For the good spirits, being already well-disposed, required only not to be offended, but the evil spirits, being bent on harm, had to be actively placated. This, at least, is easily comprehensible when we reflect how often, even among modern men, conventional conduct is attributable to fear of the Devil rather than love of God.

In all this, obviously, we discern the roots of religion, and there is good reason to believe that religion owes its origin much more to the desire to know than to any innate instinct of worship, devotion, or reverence. It is also significant that this body of ideas summarized primitive man's entire accumulated *knowledge* of the world in which he lived. Very peculiar knowledge, we would call it. Rather would we designate it superstition, and vain imaginings. But to primitive man it was his explanation of his observations just as is our scientific lore. And to him it was just as true as the best of our scientific knowledge is to us. At any rate—and this is the most significant feature of the whole matter—for an immeasureably long period of man's development science and religion were one and inseparable. His science was his religion and his religion was his science. It makes little difference whether we say that primitive man explained natural phenomena in religious terms, or that he discussed religion in scientific parlance. To be sure, the science would not be accepted as such by us—but neither would the religion.

Religion

In this body of ideas, and the impulses back of them, we find another of the great constants of social life. Somebody has said that man is "incurably religious." Properly dated, this is an acceptable sociological generalization. Religion seems to be necessary for social man, in the sense that no society has ever been discovered in which some form of religion did not function. Religion is necessary because there is something in man (date, A.D. 1927) that demands it. In all social affairs, then, religion can be counted on as a factor.

Religion and Science

The split between religion and science is a matter of very recent occurrence, and is not yet fully accepted by all religious bodies. It is the cause of so much confusion and turmoil, however, in social affairs that it is well to have as clear a notion as possible of its nature. Both science and religion represent man's attempts to explain the nature of the universe, and of human experiences within that universe. As long as the only explanation that occurred to men was that of agency, there was no occasion for distinguishing between the two. Agency was adequate to explain everything. Knowledge was not divided up into two conflicting bodies, nor was any such schism even dreamed of. The rift began to appear with man's first dim vision of the existence of natural forces. The conception that matter contained within itself the power to act, independently of life or of an indwelling spirit, was revolutionary in the extreme sense of the word. Each added bit of information about the qualities of matter, each new insight into the essence of natural forces, widened the split. Eventually two entirely sep-

arate bodies of experience emerged, one called religion and the other science.

To the latter was assigned the whole range of experience that is acquired through the physiological senses, that is to say, experience associated with matter. To religion was committed whatever is left. It is common to refer to science as the realm of knowledge, and to religion as the realm of faith or belief. This is in a vital sense inaccurate. We have already seen that there is an inescapable element of belief in science. Is there also an element of knowledge in religion? If by knowledge we mean simply scientific knowledge, of course there is not; but this is to beg the question. The real issue is, is there any knowledge apart from that acquired through the senses? Can you know anything that you have not seen, heard, felt, smelled, or tasted? The genuinely religious man has no hesitation in answering this question in the affirmative. One who has had what he regards as religious experiences (not *a* religious experience in the cant meaning of the phrase), who has made religious observations, is convinced that there is such a thing as religious knowledge. To him the man who denies such a possibility seems just as futile as the man who denies that there is such a city as Constantinople because he has never been there.

Difference in Method

The effort is often made to divide science and religion on the basis of the fields they occupy—science having the material field, religion the spiritual; science having the field of the knowable, religion of the unknowable; science the finite, religion the infinite, and so on. This is suggestive and

helpful, but it is inadequate. The significant difference is not in the field but in the method. The field of both is human experience. But the method of science is, as has been said, first of all observation, measurement, testing, by the senses. To a large extent it is purely descriptive. In so far as it attempts to go beyond description and afford explanations, it relies exclusively on the method of cause and effect, that is, it invariably proceeds from one thing to another either forward or backward. An explanation of this sort is, obviously, merely a statement or description of a process, and no real explanation at all in the ultimate sense. Science, therefore, stands helpless in the face of the demand for explanations. Science must always have something antecedent. Thus, for example, to take one of the greatest problems of the human imagination, there is not the slightest possibility that science can ever explain the origin of the world, to say nothing of the universe. It may trace its history back never so far, yet it must always have something to start with. Every stage may be carefully expounded clear back to nebula or chaos. The question, Where did the nebula come from? is exactly as great a question as, Where did the World of William Clissold come from? Science may eventually show that all the chemical elements we know today have been evolved from some single form of primeval matter. The need of explaining the existence of a kind of matter with such amazing potentialities is just as great as the need of explaining all the present forms of matter. The hallmark of science is knowledge, and knowledge has its limits.

The hallmark of religion, on the other hand, is belief, and belief follows an entirely different method from science. Religion can no more explain the origin of the earth than can science. But religion disavows any obligation to explain the origin of the earth, in the customary sense of explain. The religious man frankly admits that there are many things in heaven and earth that can not be explained in any such way. He puts all question of explanation aside, summons to his aid all available knowledge, and then leaps unreservedly into belief.

To the average modern mind, overshadowed by the scientific obsession of the age, neither of these postulates is satisfactory. Schooled and steeped in the method of cause and effect, the soul craves an explanation of everything, from the lowest to the highest. Out of this dilemma there seems to be no way. It appears to be just one of the limitations laid upon the human animal spinning out his existence on a material world which, as we saw at the beginning, seems preordained to be a world of struggle. There is one thing, however, that can be done. That is to avoid as far as possible turning over to either one of these great institutions problems that can be handled, if at all, only by the methods of the other. To do so is unjust to both. It is quite as unfair to religion to ask it to explain the physical ancestry of man, as it is to science to demand that it expound the nature of God.

It is not impossible that in the future a clearer vision will bring science and religion together again.

Religion, then, is one of the great uniform needs of

human societies. But, though the need is uniform, the solution, as in practically every similar case, is Legion. While the ways in which societies have worked out their religious problems fall into certain great types or categories—pantheism, ancestor worship, fire worship, dualism, polytheism, monotheism, etc.—in the details there are almost infinite variations. Consequently, religion becomes one of the most distinctive social characteristics of groups, and religious similarities rank high among the ties that bind human individuals into groups. Some of the most potential groupings in all ages of human society have been those based upon, or at least associated with, religious affiliations.

The Family

Another universal need of social man is some standardized and more or less permanent association between men, women, and children. The solution is the family. We can not stop now to inquire into the origin of the family, to seek to discover whether it traces back into man's prehuman ancestry, as there is very good reason to believe, or whether it is distinctly a human creation, being preceded by a general period of promiscuity—a theory once popular, but now very largely discredited. Nor can we attempt to learn whether its source lies in the mating impulse, as we are much too likely to take for granted, or in the group of economic desires, for which there is much evidence. Our present purpose is to observe that the family, by the tests of past experience, has proved itself to be an indispensable factor in human association. Here once more, while the basic types are few—polygamy, polyandry, and monogamy—the variations

upon these great themes are multitudinous. Social groups have worked out the same great problem, but they have worked it out each in its own way. The family institution stands scarcely second to any as a basis of group unity.

As we have seen, knowledge long antedated scientific knowledge, the arts preceded the sciences. One of the first lessons that men learned was that knowledge is power. They early comprehended that the group that wished to hold its own in the fierce competition of life must have some method of passing on to the rising generation the knowledge that it had hitherto accumulated at the cost of so much pain and effort. Consequently we find in every society the world over some educational system. As a rule, this was originally identified with the family and later, partially at least, with the church. Eventually it became a virtually independent factor. Educational systems differ from each other, but everywhere they operate as an important basis of group unity.

Education

Another universal and fundamental need of social groups is order. To secure these societies have invariably developed two great institutions of control, public opinion and public sentiment, with their auxiliary the moral code, and the state, with its instrument the law. We shall have occasion to dwell upon these at greater length hereafter, so we need not do more than note their importance here.

Order

These are only the more important of the life problems of social groups, that result in institutions, folkways, and mores. There is a host of others, the need

of play, of dress, of ornamentation, of dancing, of esthetic expression in art, music and literature. The point to be grasped is that in these, as in the more fundamental interests, like ways of doing things bind people together, dissimilar ways tend to separate if not to antagonize them.

Complex of Interests

The groupings based on these various major and minor interests, interlace, and overlap in the most intricate kind of a way. The economic system represented by modern capitalism throws a network pretty much all over the globe and entangles itself with many social groups that have little else in common. The institution of polygamy cuts across many group boundaries set up on other bases. Many church organizations, among them some of the most coherent groups unified by a single tie on earth, function within a wide variety of other groups. The sport of baseball has its devotees in Oriental as well as Occidental lands, and the movies are a great intergroup amalgam. So general is this interlacing, that it is evident that no single need or interest can underlie those great coherent groups which stand out most prominently in modern life, which we think of spontaneously when group organization is mentioned, and which we usually refer to as peoples, nations, states, or countries.

The fact is that the functioning groups in modern life, and probably in all earlier stages of human society, rest upon more than one common bond, however potent that may be. A number of unifying interests must combine before any such group can exist. Our next question is, how are such combinations formed, and how

did the functioning groups of modern life come into existence?

Group Formation

Once more we go back to the period of dispersion, and to the primary human groups. These we find unified first on a geographical basis, second on a racial basis, and third on a cultural basis. It is the cultural basis of unity that now demands our attention. These primary groups, necessarily unified by geography, were forced to face their life problems and work them out communally. This, as we have seen, they did, with respect to the economic system, the family, the educational system, the religion, and the sports, games, dances, dress, decorations, art, and literature. These folkways, differing widely as they did among groups, came to be just as characteristic of each respective group as its geographical location, or its racial traits. Thus travelers of all times, attempting to describe the people of a given region, have noted alike the color of their skin, their stature, the type of their hair, their occupations, their religious practices, their family customs, their dances, their weapons, etc. as if they were all similar characteristics of the group. And they are, indeed, all genuine group traits, though some of them depend on physical ancestry and others represent gradually developed social solutions of group problems, preserved by social transmission. The group itself, furthermore, makes no distinction between them. All are equally familiar, customary, and therefore right, proper, and beautiful. Toward the whole complex of group traits there inevitably develop sentiments of acceptance, approval, loyalty, devotion, respect, admira-

tion, and willingness to defend if necessary. Thus these traits are both the results of group unity and powerful supports of group unity. Group feeling is a universal social constant, sympathy toward the in-group and antipathy toward the out-group. The social scientist, in his analytical mood, may dissect this feeling and separate it into two component parts, calling one race feeling and the other cultural feeling. For scientific purposes it is important that he should do so. But nature man makes no such distinction—nor does modern man to any great extent, for that matter. One and all are characteristics of my group; therefore they are right characteristics, and I will uphold them and defend them to the last ditch.

Bonds of Unity

The importance of these *social products* in binding groups together, and also in forming groups, can not be overestimated. It is not for us at present to inquire how or why this devotion and loyalty to customs and institutions arise. It is enough that they exist. It is, however, essential to grasp the fact that while these folkways originated in the first instance coincidentally with race traits, and were for long periods inseparably associated with race traits, there is nothing actually racial about them, and there is no inherent reason why they should remain affiliated with any particular racial group. In other words, race traits and cultural traits are two independent factors, and while often associated they are not necessarily so, but may separate and go off on divergent pathways. This is what actually happened in innumerable instances when the period of race contact set in, and the primary

groups began to move about, jostle each other, overlap each other, and mingle with each other. Great racial and cultural changes took place in different geographical regions. In some cases the culture changed while the race remained virtually the same, as for example in Greece during the Hellenistic period, when a very small body of invaders from the north, of a different race, imposed a new culture upon the great body of Greeks who remained practically unchanged in race. In some cases the race changed while the culture remained the same, as in the later history of Greece, during which profound racial changes took place without seriously modifying the culture. Sometimes a single great culture would spread over a number of racial groups as was the case in the great Aryan expansion, and the Celtic movement into western Europe. Sometimes moving racial groups would absorb the culture of the lands in which they settled as happened with some of the Asiatic invaders into eastern Europe.

Thus with the progress of civilization racial unity and cultural unity have become profoundly entangled and confused. Some of the groups we call nations or states have essential unity in both race and culture. Some are racially diverse but culturally unified. Others are racially homogeneous, but culturally complex.

Nationality

We need a name to designate a group that is bound together solely by cultural unity. There seems to be no better word than "nationality." A nationality may be defined as a group of people who are bound together by a common solution of several of the great problems of social life. The

more of the basic folkways they have in common the stronger will be the nationality, but there must be at least three or four of the fundamentals and as many of the minor ones as possible. One that is almost indispensable is language, though Switzerland has shown that if there is unison in enough other particulars, a common language can be dispensed with. Another is religion, though the United States has demonstrated that community of religion is not necessary. Agreement on a moral code can hardly be forgone. Nationality is largely a matter of feeling, and has in fact been defined as a group of people who feel that they belong together, or who have enough in common to make them wish for a common life. Nationality is also sometimes used to designate not the people, but the complex of customs, institutions, folkways, traditions, beliefs, ideals, standards, and loyalties that bind the people into a group.

The "principle of nationalities" was clearly recognized in the adjustments that followed the World War. A serious effort was made to arrange the new group demarcations to correspond with the boundaries of national feeling. The attempt was by no means wholly successful, partly for the very reason that we have pointed out, that racial bounds and national bounds do not necessarily coincide, and each has its set of loyalties. So an alignment that was satisfactory enough from the nationalistic point of view, might run afoul of vigorous racial feelings, and *vice versa*. Another difficulty was that, as we have seen, economic alignments very frequently disregard national affiliations.

Every nationality desires the fullest possible common life, but it does not by any means always get it. Its most common and irritating failure is in adjusting the bounds of the state, that is the political unit, to those of the nationality. State and nationality all too frequently fail to coincide. Sometimes the state includes several nationalities as was the case with the old Austro-Hungarian Empire and is the case today with the Kingdom of the Serbs, Croats, and Slovenes and Czecho-Slovakia. Sometimes a single nationality is partitioned off into several states as is practically the case with the British Empire under its new régime. Really the one thing that keeps the British Empire in any sense a unit is nationality. When a nationality achieves its natural goal, and establishes its own political control over its own geographical territory, we have the "nation," which, it is clear, is synonymous with neither nationality nor state. When to national unity, and political and geographical independence, is added the element of racial homogeneity, we have the ideal nation. Few such exist today.

Something of the complexity of the group organization of modern life should be clear by this time. Races, nationalities, states, nations, peoples—all are realities in some sense or other, all have their common features, all have their loyalties and their antipathies. Is it any wonder that man feels the need of a social science to help him grapple with a human environment of such intricacy! There still remains one type of social grouping which might seem to have claimed first attention in a book on social sci-

Society

ence. This is "society" itself. We have used the word repeatedly—it is time to try to define it. There are almost as many definitions of society as there are books on sociology, so there can be no objection to adding another. A society is a group of people actively coöperating in the pursuit of a considerable number of the major and minor interests of life. The essence of society is a functioning body. It is, you might say, the *pragmatic* social group. It works. There is no universal formula. A number of the bases of group unity must be present—without them it would not work. But there is no specific selection or combination required. Coöperation is the hallmark of society. Society, therefore, is distinctly more organic than any of the other basic groupings.

On this definition, evidently, it is impossible to assign any spatial limits to society. In fact, the term is used to include almost as many gradations in human classification as the word "race." Thus it has become customary to use the term "The Great Society" as practically coterminous with mankind. We speak of "European Society," "Oriental Society," "American Society" and so on down the line to minor subdivisions such as villages. In an artificial sense it is carried over to designate arbitrary formal groups—the American Eugenics Society, the High School Literary Society. There is no disadvantage in this, provided the notion of a functioning unit is kept in mind. In practice the societies dealt with in the discussions of social science tend to be practically coincident with nations or states, probably because the state is one of the principal agencies

through which a society functions, and a fully developed society can hardly exist without a political organization at its command.

Societies themselves are natural growths, evolutionary products. They are as inevitable, man being what he is, as lightning is inevitable, electricity being what it is. They are the device that man has evolved to serve his life interests. There can hardly be any question that in the "telic" sense society exists for man, not man for society, nor society for itself. Society is a human device like a stone hammer, a marriage ceremony, or a dictionary. That it evolved for a long time unconsciously on man's part makes this no less true. Society is the most significant human environment of the ordinary individual.

Mastery of Society

Modern man's most characteristic ambition is to do with society what he has succeeded in doing with the physical world, to know it, to understand the nature of its elemental particles, to comprehend its forces, to state its laws, and so to be able to master it, to make it serve him, to adapt it to his needs instead of being compelled to adapt himself to it. To the conservatively minded, and particularly to the practical social craftsman, this seems visionary, foolish, and impertinent, just as the program of physical science seemed when it was first proposed. In social affairs as in material affairs long before the dawn of science effective practical arts had been built up by empirical methods and long experience, and measurably satisfactory results produced. The competent craftsman resents the intermeddling of the theorist, just as

the proud southern cook resents being told that she can learn anything about cookery from a professor of domestic science. But the die is cast. Man has turned his eye upon his human environment, and will not be deflected until he has it in his grasp.

CHAPTER VIII

CONTROL BY THE CONTROLLED

ONE peculiarity of the human environment, it hardly need be observed, is that the units that are subject to it are themselves component parts of it. Man is both the environed and the environment. In spite of this feature, however, the human environment presents many strong resemblances to the physical environment. Like the physical environment, the human environment sets conditions which its denizens must be adjusted to. But in the latter case, because of the greater element of consciousness and self-control involved, we call this adjustment not adaptation but "conformity."

Like physical environments, human environments differ from each other. Each society has its own set of requirements. In harmony with the dynamic character of all social phenomena, these requirements are constantly changing. Conformity to the requirements of society is a continuing process, not a state. But at any given time the requirements of a society are almost as absolute as those of a habitation district. The historical causation of societal features is a fascinating subject, but much too long and complicated to be entered into here. What concerns us is to observe that in every society at a given time, such a set of requirements exists. They are associated

Social Adaptation

with or include every one of the social products which as we have seen result from group efforts to solve life problems, language, religion, the economic system, the educational system, sports, dress, and so on. Each one of these institutions, folkways, or mores has its own standard of rightness. Combined, they constitute the general standard of rightness of that society at that time.

Normality

One of the first steps in the adequate handling of social affairs is to get a concise and clear conception of what constitutes social rightness. One of the common words for rightness in various connections is "normality," and we can do no better than to adopt that word for our purposes, and seek to give it as definite a connotation as possible. In ordinary use, the word normality is compounded of two separate ideas, average and ideal. Sometimes one predominates, sometimes the other, and sometimes they are hopelessly confused. One writer, in attempting to straighten the matter out, insists that normal can mean only average or ideal, and clarity of thought and expression requires selecting one or the other and sticking to it. But this solution hardly meets the case. We all feel intuitively that there is something to the word normal more than, and different from, either average or ideal. We find ourselves wanting to use the word in various connections where neither of the others will satisfy. There is a shade of meaning that we wish to convey that is difficult to define, but which, upon testing, neither of the substitutes will quite indicate. Thus in any average barrel of apples purchased at the gro-

cery store there will be a number that are bruised and a few that are slightly rotten. But we do not like to admit that it is normal for apples to be bruised and rotten. On the other hand, an ideal barrel of apples would all be uniform in size, perfect in color and flavor, and without spot or blemish. But we can not assume that it is normal for apples to be like that. Normality seems to lie somewhere between the ideal and the average. For if normal means average then anything above the average is abnormal—a school child for instance, whose I. Q. is above the standard for his age. And if normal means ideal then it never exists, and all life is abnormal, for the ideal always keeps ahead of achievement.

Some insight into the meaning of normal in social affairs may be gained by considering one of its commonest and most logical applications to other matters —the normal temperature of the human body. This, we say, is 98.6° Fahrenheit. This is certainly not the average, for the average would include sick people along with the well people, and since there are presumably more people at any given time with fevers than with subnormal temperatures, the average would be somewhat above 98.6°. And it is not an ideal, in the ordinary sense of the word, because it is a preponderantly usual condition. What is it then? It is the temperature at which the human body, constituted as it is, functions best in a state of health. A normal temperature of 98.6° is wholly relative to the human body; in another kind of body, a frog's for instance, normality would be something very different.

So in a society, normality is relative to the composition of that society. Normality is that state which conduces to the smooth functioning of the society. A society could be said to be in a wholly normal state when every department of it was functioning smoothly and efficiently in relation to every other department. As a rule we use the term normal to refer to a single part of the social organization rather than to the whole. We say that the currency is in a normal state, that there are normal stocks of goods on the shelves of stores, that the marriage rate and divorce rate are normal, etc. The test of normality is, or should be, whether the factor in question is in such a condition, or is operating in such a way, as to promote smoothness, efficiency, and harmony in the functioning of the society as a whole. Normality, then, is purely a relative term. It is gauged not by the criterion of a perfect society, nor an ideal society, but the existing society "as is." Many things that would not be normal in an ideal society are quite normal in such societies as we find in the world of today.

Take, for example, the question of labor of children between sixteen and eighteen. This is certainly not ideal. In a Utopia things would be arranged so that children of that age would not have to labor, but would be free to learn, to play, and to develop their latent powers. On the other hand, it could hardly be called the average in the United States, for possibly half the children of that age do not labor. But many do, and to a very large extent their labor is normal. One of the best ways to test nor-

mality is to consider what would happen if a change were suddenly made. Suppose tomorrow a law were passed summarily thrusting out of their jobs all children between sixteen and eighteen. What would happen? A certain number of widowed mothers and incapacitated fathers (not as many as the champions of child labor would have us believe; but nevertheless some) would be deprived of their main means of support, and, no other provision having been made for them, would necessarily become paupers. Many industries would suddenly find themselves deprived of workers in essential operations. The disturbance of these industries would affect others, and a general business upset would follow. Worst of all, probably, a large number of young people would suddenly find themselves out of occupation, "all dressed up and nowhere to go." They could not go to school, for the schools are already crowded and the teachers overworked. They could not do anything that costs money, for they would have no money to spend. There would be a plague of idleness in the land. All of which emphasizes that the normal is very often far from the ideal, which means in turn that it is the business of society in numerous cases to set itself to the improvement of the normal. But this takes time, effort, and planning. Applied specifically to child labor, it does not mean that society should not set itself to get rid of it as soon as possible. But it does mean that the task should be undertaken wisely and deliberately, not precipitately and blindly.

You may have a motor car of the vintage of 1921. It chugs along fairly efficiently and usually gets you

where you want to go. But the clutch is decidedly antiquated. You learn that the makers are introducing a better design and you take your car in to have the new clutch installed. But you find, of course, that the new clutch is made to fit the new car, and it can not be put into your car or if it could be it would not work. The fine new clutch is not normal in your car. It is not impossible that even if you could find an unused clutch of the same year as your car it would not work as well as the old one. Your car is worn, and bent, and more or less distorted. But the parts have worn together, and now they will work together better than if some of them were new. No human society is perfect. It is built up of imperfect human particles. Its features are the product of ages of not too intelligent self direction on the part of those particles. But it is a going concern. Almost any one with the least imagination can "think out in bed," as Professor Sumner put it, some improvement that might be made in one or another part of its complex mechanism. But the question is, would it work in conjunction with the other parts or would it do more harm than good. A workman, spending his days tending an intricate machine, may see some cog or lever that could be improved. Pleased with his discovery, he calls it to the attention of the foreman. The latter, more versed in engineering, points out that if this part were changed the adjacent parts with which it articulates would have to be changed also, and that would involve still more sweeping alterations until in the end the whole machine would have to built over. If the new device

is of sufficient importance it may be worth while to scrap the old machine entirely and build a new one around the new part, just as it might be worth while to go through a considerable social upheaval to get rid of child labor. But that is a matter for careful thought and extended deliberation.

"If this poor old world is as bad as they say, one more reflection may check the zeal of the headlong reformer. It is at any rate a tough old world. It has taken its trend and curvature and all its twists and angles from a long course of formation. All its wry and crooked gnarls and knobs are therefore stiff and stubborn. If we puny men by our arts can do anything at all to straighten them, it will only be by modifying the tendencies of some of the forces at work, so that, after a sufficient time, their action may be changed a little and slowly the lines of movement may be modified." [29]

Abnormality

Any deviation from the normal standards of society is abnormality. This may inhere in the situation or conduct of some individual or group of individuals, or in some institution or phase of the social organization itself. Because a thing exists in society is no evidence that it is normal. Primitive societies, for reasons of belief, have been known to place a taboo on their most useful food supply. This does not conduce to the most efficient functioning of the society, and hence is abnormal. Part of the task of social engineering, therefore, consists in the removal of abnormalities. To understand what this involves re-

quires some consideration of the nature and kinds of abnormalities. Let us consider first those that inhere in the individual.

In accordance with the assumption of free will which, as we have seen, characterizes actual social procedure, personal abnormalities have been conventionally grouped into two classes, first those for which the individual is held personally responsible, which may be called "misconduct," and second, those for which the individual is not held responsible, which may be called "incompetence." Misconduct in turn may be subdivided into a number of grades according to the degree of the wrongfulness that society imputes to the act. At the top of the list stand breaches of some of the canons of society where the element of right and wrong is almost negligible. Society sets certain standards that it expects its members to live up to, but which it does not regard as serious enough to associate with any very severe condemnation for violation. These are matters of custom, convention, and fashion. Innovation, unconventionality, and unfashionableness are frowned upon by society, but they are not very sternly repressed nor severely punished. Next in order come such standards as propriety, decorum, and decency. These are regarded as more weighty, and violations receive heavier penalties, but even to these society does not devote a great amount of attention. Still lower come decidedly questionable modes of behavior such as trickery, sharp practice, and overreaching. Finally, at the bottom of the list come actual sin, immorality, vice, and crime. Sin is a general term, not easily defined except in ethical or religious

terms. Immorality, vice, and crime are quite definite forms of misconduct, and require some detailed consideration.

Immorality is any breach of the moral code. The moral code, in turn, is society's statement of what may not be done without incurring serious social disapprobation, and as such is one of the most intangible, elusive, and withal adamant of all social factors. It does not exist in written form (though recent efforts have been made to reduce it to print especially with respect to children). No one is authorized to enunciate it with finality. It is in a constant state of flux. Yet it is one of the most inescapable and powerful forces with which any individual comes into contact during his whole lifetime. Every one of us is vividly conscious of its existence and almost automatically accepts its authority.

Immorality

The moral code is distinctly a social product. It specifically emanates from society, the functioning unit. Consequently it is different in every different society. It is one of those solutions of uniform group needs that in their multiform variations become distinguishing features of particular societies. In general, the moral code seems to represent society's reactions against its life experiences. It expresses some of the more important things that the human environment has learned to exact from its individual members in order that, through itself, they may prosper. Consequently it must grow and change with the growth and development of society. It is always purely relative to a given society, and yet within that

Moral Code

society it is always absolute. It is an essential element in nationality and so can not operate effectively across the bounds of nationality. A society that contains two or more nationalities has to lean more heavily on other expedients to secure unanimity of behavior. The ordinary individual, as a part of his social nurture, comes unconsciously to recognize the moral code to which he owes allegiance and accepts its sway without either question or reflection. It requires a high degree of sophistication to challenge any of the tenets of the moral code under which one has grown up, and vigorous effort to really destroy the sense of allegiance that one owes to it. In a highly dynamic society, where the moral code is changing fast, it is even difficult to keep pace with the developments in one's own society. The impress of the moral code sinks most deeply during the plastic years of infancy, childhood, and youth and leaves patterns which harden with the years and become increasingly difficult to eradicate. This is the explanation of the perennial outcries of decadence and querulous plaints against the "wild young people" that characterize each successive generation. Like almost all phases of nationality, the bond between the individual and the moral code is largely a matter of feeling. It defies the attacks of argument or reason. Each individual carries his moral code with him, and it can be modified only by processes similar to those which implanted it in him in the first place. A person's morality is to be judged by his faithfulness to the moral code that he acknowledges, not by the character of that code it-

self. There is no more pernicious proverb than that which counsels you, "When in Rome do as the Romans do." For, unless you are a Roman by nature, you do not and can not feel as the Romans do, and without a Roman feeling your attempts at Roman behavior are sure to make you ridiculous if nothing worse.

Morality and Religion

The relation between morality and religion is a matter of great interest. It is commonly assumed that there is a very close connection between them. It is often assumed that religion is the source of the moral code. Historically speaking, however, there is every reason to suppose that as far as personal behavior is concerned the moral code antedates the religious code. The moral code represents society's formulation of the rules of behavior which group experience has shown to be conducive to group welfare. Religion is primarily the result of an attempt to explain natural phenomena; the aspect of religion as a guide to individual conduct is a later derivation. The actual relation appears to be that as religion becomes more formalized, and the interest of divine beings in the conduct of the individual man comes to be more definitely postulated, the best standards of the group (perhaps not always the best, even) are transposed into the religious sphere, and imputed to the divinities. What was previously the expectation of society now becomes the will of God. It thereby, obviously, attains greater authority and comes back to society with added sanction. As social standards progressively advance they will continue to be attributed to divinity, until it

becomes easy for the unsophisticated individual to look upon religion as the ultimate source of all codes of behavior.

Social Wisdom

It is important to realize that morality for the individual is not synonymous, nor necessarily coincident, with normality for society. Societies make grievous blunders in working out solutions to their life problems, and require things in their moral codes that by no means conduce to the smooth functioning of the social mechanism. So while a given society's moral code is always right in the sense of being blameless, it is not always right in the sense of being wise. It is quite possible, if a sufficiently detached point of view can be achieved, to compare and evaluate moral codes (including that of one's own society) on the basis of their adaptability to the end for which they really exist, the promotion of individual welfare. And it is one of the immediate duties of social science to do exactly this. The polygamous, head-hunting, wife-stealing savage on some southern isle, if he is living up to his code, is just as moral as the most impeccable gentleman of New York or London—but he may not be as intelligent, nor as well-advised. It is conceivable that the time may come in any western country when trial marriage will seem right to the young people of the day. It will accordingly be right, but it will not necessarily be socially salutary. Morality is essentially a matter of belief. Social expediency is a matter of science. So while a society as a whole can never be immoral, it may have many abnormal features.

Vice, on the contrary, is primarily a matter of biology and secondarily a matter of psychology. Its social implications are derived. Every typical vice is connected with some natural impulse that is so important to the welfare of the individual or the race that there is associated with it not only a penalty for non-fulfillment but a distinct pleasure upon fulfillment. Thus the vice of gluttony is connected with hunger, the vice of licentiousness with love, the vice of drunkenness with vanity, etc. There is a temptation to gratify the impulse, therefore, simply for the sake of the attendant pleasure. Vice arises either from an excessive yielding to the impulse, or from yielding for the sake of the attendant pleasure alone regardless of the natural purpose for which it exists. The consequence of vice—that which really makes it vice—is the deterioration or destruction of either the body (the biological aspect) or the mind (the psychological aspect). This in turn makes the individual a less efficient or positively harmful unit in a functioning body, and so enlists the interest and attention of society. It is one of the striking characteristics of self-conscious societies that they can not and do not allow their members freedom to do what they will with themselves. An act of an individual which tends to destroy himself is just as truly anti-social as one directed toward other individuals or toward society itself. Furthermore, most vices tend by their very nature to be highly contagious. Consequently, society deals very harshly with vice.

Vice

Crime is the most definite and objective of all forms

of misconduct, being the violation of the explicit laws of the state. As such, we shall deal with it in further detail later.

Crime

Incompetence may be divided into two categories, which may be designated "incapacity" and "maladjustment." * The first includes those cases where the difficulty lies with the characteristics of the individual himself. He may be crippled, or sick, or feeble-minded. He "wills" to do his part in society, but it is not in him. The other includes cases where the individual is inherently all right, but he is not properly articulated with his human environment. Oftentimes the fault lies with society itself. Typical cases are competent workers who are thrown out of employment by a strike in which they have no part, healthy young women who are in one respect superfluous because the nation has lost many of its young men in war, architects and builders during a building depression. In these cases both the will and the ability are present, but the opportunity is lacking.

Incompetence

In pursuance of the fact that the human environment is composed of the individuals who are subject to it, it follows that social engineering, that is, the deliberate manipulation of the environment to suit human needs, must take account of the individual. The most immediate, and probably the simplest, of the practical tasks of social science is that of bringing abnormal individuals back to normality.

Social Engineering

* It becomes monotonous to say "for want of a better word." Social science stands in dire need of a carefully formulated, standardized, generally accepted terminology.

This may be called personal reform. In accordance with the two-fold division of abnormality there are two distinct methods of procedure which society should follow. In case of misconduct pressure must be brought to bear upon the response mechanism. In case of incompetence, the will not being at fault, some other expedient must be adopted.

It is clear that the complete adoption of the modern psychological interpretation that eliminates the will entirely would break down the walls of demarcation between the categories distinguished in the foregoing pages. All forms of personal abnormality would become aspects of incompetence. The theory underlying the methods of control would have to shift accordingly. Something of this sort is hinted at in the recent phrase "social inadequacy." But contemporary societies are far from having adopted the new psychology as a basis of their procedure, and so in considering the existing methods of social regulation it is impossible to ignore the assumption of free will.

Social Control

Society's devices for inducing socially-correct choices and discouraging the opposite are among the most interesting and significant of social products, and include a very large part of the total of society's activities. They fall under the general head of social control. Just as the physical environment can not produce any traits that are not provided for in the germ plasm of the species in question, so the human environment can not elicit any behavior that does not have existing springs in human nature. Society has to produce its results in individuals by work-

ing on what is there. In as important a matter as social control, it has to utilize the material to the fullest. It has to make use of every possible appeal from which it can hope for a response. The qualities in human beings from which response can be secured are their desires with their attendant interests. In a concise formula, society exercises control through interests.

Classification of Interests

Interests may be classified in two different ways. The first classification is itself two-fold, and rests upon the basis of the person benefited. Egoistic interests are interests in the welfare of one's self. Altruistic interests are interests in the welfare of others. Altruistic interests are commonly regarded as more praiseworthy than egoistic. This is not necessarily so. Every interest rises from a desire. If there is but one apple, and my desire that my companion should benefit by that apple is stronger than my desire to benefit by it myself, what credit is there to me? However that may be, one thing seems certain. Altruism is an essential to the development of an advanced or complicated social organization. Therefore, whether personally creditable or not, it is socially desirable. But there are limits even to altruism. One of the features of the normality of any society is the balance between egoism and altruism that it requires for its smooth functioning. As a rule, the more complex the social organization, the larger is the proportion of altruism required. The normal individual is the one who displays just the right balance. Too much altruism may be just as bad as too much egoism. Thus one of King Arthur's knights, let us say, who was perfectly normal in the

court circles of the day would be regarded as impossibly selfish in, for example, a university community in the United States, while on the other hand he would be simply an easy mark as a member of the hosts of Genghis Khan. One of the primary requirements that society makes of its members is that they should have enough egoism to look after themselves, financially and otherwise. A degree of altruism that interferes with that is abnormal. On the whole, we are still undoubtedly in the stage of "predominant egoism." It must be admitted, also, that mere complexity, and especially mere bulk, in the social organism do not always require or justify a larger degree of altruism. The requirements of our great cities seem often to be in the opposite direction. Thus the rule of "ladies first" works very well in a small village where there are only a few ladies around at any one time. But in a subway station in New York where there are ladies first, last, and all the time it becomes an impossible incongruity. This balance, like every other phase of normality, is relative to the constitution of society as a whole.

The second classification of interests rests upon the basis of their relation to each other. It makes a threefold division. Interests are Convergent, Parallel, or Divergent. Convergent interests exist when different persons have the same objects of their desires. Parallel interests exist when they have similar objects but not the same objects. Divergent interests exist when they have different objects. Convergent interests create the most difficulties.

These fall into two distinct classes, conflicting inter-

ests and common interests. Conflicting interests exist when the object of desire is of such a sort that if one of the "desirers" gets it none of the others can get it; in other words, they are monopolistic. Common interests exist when the object of desire is of such a sort that all the "desirers" can get it together, and usually it is difficult or impossible for any one to get it unless the others do.

Illustrations of conflicting interests abound in everyday life. Thus the Presidency of the United States creates conflicting interests every four years. The football championship of the Big Three created conflicting interests in the days when there was a Big Three.

Every race, every competition involves conflicting interests. An auction is an admirable example of conflicting interests. Taken by themselves, conflicting interests are dissocializing. They tend to keep men apart, or, if they bring them together, it is on terms of rivalry and hostility. If conflicting interests were the only kind there could be no society. This was nearly the exact situation when men were living on the collection stage. When all material supplies consist in the limited provisions of nature, the attitude toward those supplies is distinctly monopolistic. The ideal of the collection man is to be alone in the wilderness, so that whatever he finds may be undisputedly his own. This is one of the reasons why society was so rudimentary on the collection stage.

Common interests, on the other hand, are definitely socializing. They bring men together into coöperation, in fact they are almost exclusively what brings men to-

gether into coöperation. They are the great social cement. Without them there could be no society. We have seen that the dawn of a genuine human society is coincident with the origin of the hunting band. The big game animals were objects of desire of every savage. But each knew by experience that he could hardly hope to capture one alone. The only basis upon which he could get it was that the others should get it also. This meant that when they did get it, he could not have it all. But some elephant is better than no elephant, and so a drive was organized. So in modern life, the President of the United States becomes an object of common interest when a speaker is needed for the opening of a State Fair; the Yale-Harvard game is an object of interest to all who hope to witness it; the necessity of electing a President provides a common interest for the members of all parties.

Combined Interests

Some of the most interesting of all sociological phenomena are provided by the very frequent cases where the same object enlists both conflicting and common interests. This usually means that before the common interest can be achieved the conflicting interests have to be harmonized. The football arrangement of the Big Three represented a great common interest between Harvard, Yale, and Princeton. Before this could be accomplished, various conflicting interests of the three institutions had to be harmonized. When the conflicting interests became stronger than the common interest, as the event proved, the arrangement collapsed. Every presidential election involves an almost incredible harmonization of con-

flicting interests for the sake of a great common interest. The common interest is that the United States should have a president for the next four years. The immediate conflicting interests are between the two or more parties and the two or more candidates. But previous to the election it has been necessary to harmonize the conflicting interests of the various aspirants for nomination in each party. If these conflicting interests are too stubborn, as the Democratic Convention of 1924 showed, the common interests of the party may be sacrificed. Behind the National Convention there is a long series of successful harmonizations, in the State Conventions, the caucuses, the primaries, the ward meetings, the committee meetings, and all the various agencies of representative government.

Take one more illustration. In a certain suburb there is a need for a branch line to be run out by the electric railroad. In current conversation every one agrees that it would be a good thing. It is learned that before the railway company will undertake the enterprise there must be assurance that the community really desires it. So a mass meeting is held, and it is proposed to send in a petition. Immediately difficulties arise. It appears that nobody wants the line to run too near his house. Everybody would like to have the station near his residence but not too near. There is a decided difference of opinion as to when the express trains ought to be run. And so it goes. Unless these differences can be reconciled the petition will not be signed and the suburb will not get its railway. In many cases the stubborn insistence of one or two people can block an enterprise

with reference to which the great majority have come to an agreement. One of the best illustrations of this is afforded by the United States Senate. The necessity of securing the common interest in such cases is what causes governments to give certain public enterprises the right of "eminent domain" or "condemnation."

Thus the harmonization of conflicting interests for the sake of greater common interests—or what has been called "antagonistic coöperation"—lies back of the entire process of democratic government. It is implicit in the whole idea of majority rule. It also underlies the whole economic system of western countries. Our economic life is based on the principles of competition, bargain, and contract, all assuming predominant egoism. The smoothness with which the intricate mechanism operates most of the time is the best possible evidence of society's extraordinary success in developing and promoting the technique of the harmonization of interests. In fact, a very considerable part of the energies of society, and so a corresponding portion of the attention of social science, are devoted to this general range of activities.

Harmonization of Interests

Parallel interests are mildly socializing. They do not lead to definite coöperation but they promote casual or incidental association. Two men who like to dine at the same Chinese restaurant are likely to see more of each other than otherwise. Patrons of chamber music feel a special fellowship for each other. A dozen mountain climbers who meet on the top of Mount Chocorua on a brisk summer day need no introduction.

But in such associations there is little or none of either coöperation or competition.

Divergent interests are on the whole neutral as regards socialization. They lead people apart for the time being, but they do not antagonize them. If of two college room-mates one decides to spend Saturday afternoon playing golf and the other reading in the library, neither, perhaps, can understand the other's choice, but it does not affect their friendship in one way or the other. Parallel and divergent interests, therefore, require little social attention. The harmonization of conflicting interests, on the other hand, is probably the chief function of society, and the intelligent and cheerful participation in such adjustments is the chief social duty of the individual.

Interests of Society

Society promotes its own interests by appealing to the interests of its individual members. The primary interest of society is its own self-maintenance. To promote this it relies primarily upon the economic interests of its members. Requiring that as nearly as possible every member above a certain age should devote himself to wealth production in some form, society offers large rewards of an economic sort for industry, ability, and success in this line, and imposes more or less severe penalties for failure. Because of the strength of the economic motive in the average individual this procedure on the whole produces results. This appears to be almost the only justification for an "acquisitive society." But society does not rely on the economic appeal alone for economic

activity. It makes large use of the force of love. Many a man will work harder for his family than he would dream of working for himself. In certain cases, where the economic returns are not proportionate to the alleged value of the services—as in college teaching, for instance—it utilizes a variety of motives, including, in a prominent position, vanity. How many a threadbare professor attempts to console his wife, steaming over the washtub, with reflections on the high position she holds in the community!

A second great need of society is its own self-perpetuation. History has proved so far that what is most needed in this field is regulation rather than stimulation. Society seldom finds it necessary to supplement the mating impulse with any secondary appeals. Occasionally, however, such a situation arises, as in France today. In such cases resort is usually had first of all to the economic motives, through premiums for large families, taxes on celibacy, etc. During the War, a variety of devices to this end were proposed in Germany, some of them making a distinct appeal to vanity. At the present time Italy, with what wisdom we may best leave it to the Fascists to determine, is taxing bachelors.

In general terms, what society needs is order, regularity, and dependability—that is, *predictability*—on the part of each individual in the performance of his allotted part in the whole range of activities that have grown to be characteristic of his group and are essential to its stability and even its continuance in its present form. Through a long process of reaction to life

experience, through a long and arduous series of trials and errors, trials and successes, society has worked out its solutions to its life problems. The continuous putting into effect of these solutions is society's major concern. This requires undeviating adherence to the general scheme of things on the part of each individual. The sum total of this attitude of society toward the individual may be called "expectation," which, like morality, is not necessarily coincident with normality. The action of the individual who lives up to it may be called "conformity."

Conformity

The really amazing feature of the whole organization of society is the nearness with which this conformity to expectation approaches one hundred per cent. We are liable to be misled on this matter by the illusion of the familiar. We take these things so completely for granted that we fail to notice them, and so do not take account of them in analyzing the play of social forces. But if you will set yourself to the task of noting every instance of conformity that comes within your range on a single day you can not fail to be impressed by the almost negligible proportion of failures. The relation is reciprocal between the individual and society. You and I, as individuals, expect certain things from society; as portions of society, we expect certain things from the individuals with whom we come in contact. Every time you stick a worthless little red picture on an envelope, every time you give a valueless piece of crumpled paper in exchange for a hat or a pair of shoes, every time you sign or accept a check, every time you step into a rail-

way train, steamship, elevator, or taxi, every time you submit to the attentions of an unknown doctor, every time you order a meal in a restaurant, you are entrusting your property, your health, or your life, not to one, but to a whole chain of social atoms the constancy of whose qualities you trust without question. The surprise, consternation, or anger with which you greet a single slip anywhere along the line is the best possible evidence of the completeness of your confidence, and the practical skill with which society has analyzed and enlisted the dynamic qualities of its members.

Variety of Appeals

It is in society's interest to secure this conformity, to the maximum extent, through appeals that will produce voluntary response. This method causes a minimum of friction and entails a minimum of expense. As we have seen, society in its activities is intensely pragmatic. Any combination of appeals that will produce the desired result is good, and will be used. Some of these appeals we have already considered. Two or three others now demand some consideration. One of these is love in other aspects or meanings than that in which we have considered it. Sexual love itself, in civilized man, is something much more than the mere mating impulse. It involves a wide range of sentiments of tenderness, protection, consideration, etc. But quite apart from sexual love, there are various other forces usually grouped under the same inclusive term. It is not within our present purpose to examine into the origin of these feelings. What interests us is what interests society, the fact that they exist. One is the love of parents for children,

parental love. Another, the love of children for parents, filial love. And so we have fraternal love, consanguineal love, and various extensions into wider and wider groups until we get that extreme and highly socialized sentiment, love of humanity. One of the most important of this whole series is love of country—that is, practically speaking, love of society itself—which we call patriotism. Society's calls upon this force become most conspicuous in times of war, but they are continuous at all times. The interests which arise from this group of desires are, of course, what we have called the altruistic interests. Since they become increasingly important as society progresses we can easily understand why society lays so much stress on their cultivation, and regards as anti-social anything that tends to diminish them. Herein lies the fallacy of those who, on alleged but misapplied Darwinian grounds, argue against the care and preservation by society of paupers, insane persons, and other "socially inadequate" individuals. The principal value of such philanthropy if scientifically conceived and carried out is in the sense of altruism that it cultivates and fosters. The breach in the foundations of social life that any abandonment of such activities would cause would much more than offset any gain in practical efficiency or in the average quality of the stock.

Familial Love

There is no better evidence and illustration of man's unique place in the animal kingdom, and his wide departure from strictly "natural" reactions, than the development of parental and filial love. As we have seen (page 15) in a state

of nature parents and children are natural enemies, and to a large extent the most dangerous enemies that either has to face. This enmity carried over into the human realm, and persisted in many strange forms well down toward modern times. The killing of the old by the young, and the young by the old accounts for many widespread conventions and folkways.[30] Today, on the contrary, in every civilized country, we see parents and children ready to sacrifice their interests to each other to almost an unlimited extent.

This change is associated with another no less significant, which has taken place in the mating impulse itself. As we have seen, this force in animals appears to be nothing more than an urge to physical activity; there is no anticipation of the consequences of the activity, and so no possibility of those consequences acting as an influence on conduct. Man, on the other hand, with his power of foresight, envisages in advance the possible consequences of sexual union, which therefore become interests affecting his conduct. In man, accordingly, we find not only a desire for mating, but a *desire for offspring*. These two desires, while associated with the same act, are quite separate and diverse desires. Sometimes they work harmoniously, and sometimes antagonistically. A constant recognition of this two-fold aspect of the sexual impulse in human beings throws a bright light on many social relations and problems. The tendency of modern social evolution is to establish a sharper and sharper cleavage between the desire for sexual gratification and the desire for children, and to assume

Desire for Offspring

that human conduct will respond to the one or the other more and more independently.

So parents today, in the normal type of family, derive from their children satisfactions and pleasures that more than offset all the sacrifices that children necessarily involve. In one sense, this situation represents a high development of altruism. In another sense, it reveals an essentially human set of desires and interests, response to which is essentially egoistic. In either case, it shows emphatically that man is no longer governed by strictly "natural" impulses and that the much-advocated return to a "natural" way of life would simply mean the destruction of many of our most cherished products of cultural evolution.

Probably the greatest of all the resources of society in promoting conformity, greater than hunger or love, is vanity. The devices which society has developed to utilize this force are public sentiment and public opinion. These control the behavior of modern human beings probably to a greater extent than any other agency of society, even the economic system itself. Of course, the various appeals of society and the agencies of appeal are so intertwined that it is quite impossible to isolate and compare them (lack of experimentation) and after all it does not make any particular difference which is greater. All the big ones are so important that they are practically indispensable. The emphasis on vanity is useful because it is so liable to be neglected. Here again, the best way to test the validity of this sweeping assertion is to subject yourself to self-examination on a sample

Vanity

day, and try to see how large a part of your day's activities is really motivated by vanity. You will discover that the kind of clothes you wear, or the fact that you wear any clothes at all part of the time, the food you eat, the games you play, the books you read, the slang you use, the college you attend, the way you dance, and innumerable other commonplace or exceptional matters are dictated to a greater or less extent by vanity. As a single example of the prevalence of vanity over the economic motive, consider how young men flock into the white collar jobs at a fraction of the pay they could receive in less esteemed occupations.

Public Sentiment

Public sentiment is probably a more primitive, persistent, and pervasive force than public opinion. It is as elusive and intangible as the moral code. In fact, in a sense the moral code may be regarded as the voice of public sentiment. Public sentiment is essentially a matter of feeling and belief. It is not irrational in the strict sense of the word. In fact, it rests for the most part on a firm basis of social experience. But it is alike a-rational, sub-rational, and super-rational. In some of its aspects it is whimsical and capricious, but in the main it is firm and inflexible. It has no definite organ of expression. No one can say of it with assurance, "Lo here!" or "Lo there!" It utilizes a vast variety of expedients, as you may see by glancing over Professor Lumley's surprisingly meaty book, "Means of Social Control." No one can wholly escape it, and most of us are under its sway much more fully than we dream.

Public opinion is more definite and rational than pub-

lic sentiment; in fact, it might almost be considered as the rational phase of public sentiment. Its canons can often be set down in black and white. They are subjected to factual tests in elections, referendums, symposiums, etc. It has its organs of expression in periodical and other literature, in the pulpit, the open forum, and the theatre. Through it society handles many matters that are amenable to the methods of argument, analysis, and discussion.

Public Opinion

The matters handled by public sentiment are largely above and beyond, or below, argument. They belong to tradition, custom, and conviction. Therefore they are much more immune to successful attack. In a question to which the methods of rational analysis are applicable, there is some hope that differences of opinion may be reconciled. But in matters of convention, the more we argue the farther apart we grow, and the more firmly we become established in our own faith. Compare, for instance, an American and an Italian engineer discussing whether a certain wall should be built of brick or of concrete, with an American and an Italian father trying to agree as to whether eighteen-year-old daughters should be allowed to go out alone at night.

Consequently, public sentiment is the agency upon which society principally relies to support the dictates of fashion, propriety, decorum, and even decency. One does not have to reflect extensively upon matters of fashion to be convinced that they defy rationalization. Sleeves are first puffy at the shoulders, then at the elbow, then at the wrist, and then at the shoulder again;

skirts go down until they can go no further; then they ascend until they have to start down again in order "to keep the hem below the belt line," as some one observed at one particular juncture in the fluctuations of the two. Hoop skirts and bustles flourish, and then disappear, seemingly for good, only to show signs of flaring up again. Bobbed hair and lipsticks are as old as Babylon. A visitor strolling into a respectable country club at an interval between dances may see a group of women seated on a divan, painted up to their eyebrows, ear-rings dangling on their bare shoulders, their skirts up to their knees or higher, and all smoking cigarettes. A couple of decades ago he would have been justified in supposing that he was viewing a selected delegation of the demi-monde; now they hardly draw a second glance. In all this it is vain to look for the rational. There was just as much reason why women should smoke twenty-five years ago as today, but it was very differently regarded.

And yet what a tremendous hold it all has over us! Many of us would rather be caught in some minor moral peccadillo than appear in business clothes at a dinner where everybody else is in full dress. Possibly one of the social values of fashion is to keep people in training for conformity in more important affairs. It pays society to keep its whip-hand in.

As we descend to matters of greater social moment, the opportunity for the application of reason and logic becomes greater. The questions whether banks should lend money to their own directors, and whether the Prohibition enforcement officials should employ "under-

cover men" admit of argument, evidence, and judgment. Finally, the graver types of misconduct, murder, burglary, arson, rape, enter the domain of the axiomatic, of unquestioned belief.

Extreme Methods

Now the striking thing about social control with reference to all shades of misconduct, from the highest to the lowest, is that with the vast majority of individuals the appeals based on the old conception of the will are sufficient. There are enough constants that society can reach with positive appeals to keep most of us in line most of the time. The grosser forms of misconduct do not interest us; the milder forms are sufficiently hedged about by public sentiment and opinion. But some of the people all the time, and all the people some of the time are liable to prove intractable by such means as these. There are emergencies, extremes of temptation, when the most orderly of us are at least in danger of stepping over the line of sanctioned conduct. And there are some few whose desires are so strong, or whose powers of inhibition are so weak, or whose balance between egoism and altruism is so archaic, that the characteristic appeals of the society in which they move leave them cold. They do not react to the stimuli. For such emergencies and extreme cases as these society has two resources in reserve, two further human constants of which mention has scarcely been made as yet. These are fear and force.*

Fear is a negative quality of which the positive

* Force in this passage is obviously used in its everyday sense.

counterpart is hope. The latter is presumably an exclusively human endowment. The former runs further back into our animal ancestry than it would be profitable for us to try to trace it. There appears, however, to be this difference between fear in animals and fear in humans. Fear in animals is invariably directed toward a present object, perceived by the senses. Even the "fear of death" as applied to animals is apparently a misnomer. The animal can not conceive anything so abstract as death, and so he can not fear it. What the animal fears is a dangerous object, that is, an object which the evolutionary history of the species has shown to be a possible occasion of death. The animal fears nothing absent, and nothing in the future. Man, on the other hand, is beset by a host of fears, most of which are concerned with the future and many of which are more or less completely products of the imagination. One of the penalties we pay for our human qualities of foresight, forethought, and intelligence is subjection to a vast array of purely human fears. We fear death. We fear sickness, unemployment, old age, loss of friends, business calamity. In fact, for every blessing that human ingenuity has been able to devise, the imagination of man supplies a corresponding fear. Fortunately, our ingenuity has also devised a partial anodyne for many of these fears in the great institution of insurance. But at the best, that is expensive, and at the worst it fails to bring us full release.

Fear

At any rate, fear is an active social force that society takes full advantage of. Through it, too, volun-

tary conduct can be affected, but in ways less desirable and to be avoided as far as possible.

There remains society's final expedient, force. This is a harsh expedient, and expensive in many ways, and societies, at least of the modern type, use it as little as possible and only as a last resort. It is a dangerous expedient, so treacherous that society does not dare to leave its use to any of the ordinary agencies of control. It early learned the necessity of creating a special agency for the application of this expedient. This is the state. It would be idle to attempt to claim that this is the sole basis of the origin of the state, or particularly its sole function today. But if it were required to find a concise characterization of the state it would be hard to do better than to say, "The state is the agency created by society for the utilization of force and the fear of force." The fact, if such it be, that the state is an outgrowth of the family does not in the least detract from the validity of this definition. For the family is presumably the primary social institution, and many other institutions have grown out of it, the church and the school, for instance. And it is significant that today, in a society with a well-developed state, the two social agencies that are still permitted to use force within narrowly prescribed limits are the family and the school, and furthermore that this sanction is rapidly being withdrawn from them and committed to the state. It has almost disappeared from the school, and retains only a vestige of its former weight in the family.

Force

The state is the most concrete, organic, and well-

defined agency of society, and so important that, as we have said, no society can function without it. In fact, it looms so large in the minds of most of us that we are in danger of confusing it with society itself. This has grown increasingly true within the past century, during which western societies have transferred more and more of their regulative and constructive activities to the state until now its basic force-using function is very much overlaid with a variety of other aspects. This extension of state activities is "viewed with alarm" by a great many persons whose conception of the "right" social organization has been set in an earlier mould, and by others who on rational grounds have misgivings concerning the outcome. This is a big study by itself.

The State

As far as the forcible activities of the state are concerned it is helpful to remember that every exercise of them is a tacit admission of failure on the part of society. The essence of social action is consent, not force. Society's goal is the establishment of persuasive measures of control rather than coercive. True social progress ought to be accompanied by a progressive diminution in the compulsory measures employed by the state.

So dangerous is the weapon that society has placed in the hands of the state that its use is hedged about with many safeguards. First of all, the state is required to put its code in tangible form as definite in meaning as possible, and written ever since the art of writing was known. This, of course, is the law. Public sentiment and public opinion are trusted without any written code. But before the state can apply its weapon

of force to any individual it must have recourse to its own statement of its requirements which therefore becomes not only the nemesis but the city of refuge of the accused. Any breach of the written law of the state is a "crime" and crime is accordingly the best defined and most objective type of misconduct. One who has committed a crime is a criminal.

Finally, so obnoxious and expensive (the treatment of a single crime often costs $100,000 or more) is the use of force, that even the state itself endeavors to reduce it to a minimum. In its place, as an antecedent appeal, it strives to use fear. This is one of the outstanding arguments adduced in support of the practice of punishing criminals. The theory is that people can be scared away from committing crimes by fear of the ensuing punishment. It has always seemed almost axiomatic to societies that the degree of deterrence must be proportioned to the severity of the punishment. The natural tendency of this theory is toward increasingly drastic penalties. Its logical climax is the imposition of the death penalty for all crimes. This was virtually reached in England, where early in the nineteenth century there were well over two hundred crimes punishable by death. If the theory were sound, it would be unobjectionable. For if capital punishment were a completely effective deterrent, no crimes would be committed, and so no one would have to suffer the penalty and no harm would be done. Unfortunately, hundreds of years of penology have afforded very little evidence in support of any phase of this theory. However, it

is a belief that dies hard, as the recent Baumes laws in New York admirably illustrate.

Crime

It must be confessed that in its efforts to deal with non-conformity by force and fear through the agency of the state, society has not proved particularly successful. Crime has been steadily on the increase in the United States and in some other western countries for some time past. This in itself is not necessarily an indication of failure. For crime is a product of law, and law necessarily grows more extensive and complex with the progress of society. Every new law creates a new crime, and any one who now performs the discountenanced act is a criminal, whereas previously he was only immoral, or vicious, or tricky, or shrewd. This progression seems to be inseparable from the modern evolution of society. For one of the best established sociological laws appears to be that *increasing social complexity necessitates increasing social constraint.* This constraint, furthermore, must be increasingly by law rather than by public sentiment or opinion. For a complex society tends to be an impersonal society, and public sentiment works through the personal touch. Nowhere can one be freer from social surveillance than in New York City. But nowhere is it more necessary than in New York City to place restraints upon many departments of conduct. The only way this can be accomplished is by law.

Furthermore, the criminal law is in a sense a barometer of the social sensitiveness to the preservation of safety and order. A law registers the decision of

society to turn a certain phase of control over to the state. This may mean that the type of misconduct in question is becoming intolerably flagrant, or it may mean that society is growing more particular about what it tolerates. Crime is a definite thing. The transition between all the other varieties of misconduct is gradual and it is difficult to tell where one stops and the other begins. Unconventionality shades off into indecorum, indecorum into indecency, indecency into immorality, and so on. But the line between crime and any other form of misconduct is a sharp one. The development of criminal law represents a progressive increase in the number of things that society regards as necessary to be handled by force or the threat of force. In general, this means that less and less serious types of misconduct have been made crimes. The two basic crimes are universally conceded to be murder and theft. Scarcely a society exists so low in the scale of civilization as not to brand these two acts in some form or other as crimes. From this beginning the crime line has been pushed steadily upward until now it includes such relative trivialities as posting bills on somebody's fence, smoking in the subway, and spitting on the sidewalk. In theory the point at which a given abnormal act ought to be brought under the law is a perfectly definite one. Whenever, under the actual existing conditions in a given society, the social injury wrought by leaving a given type of misconduct to the non-legal forms of restraint outweighs the social disadvantages of dealing with it by law, the time has arrived to make it a crime. The Prohibition Amendment and the Volstead Act fur-

nish excellent illustrations of the theory—though not necessarily of the practice. The sale and use of intoxicating liquors have always been attended with a certain number of unfortunate consequences. Society has attempted to limit and minimize these consequences by vigorous use of public sentiment and opinion, religion, family loyalty, vanity, patriotism, economic interest, etc., and then has tolerated the unavoidable residuum of social injury, for the sake of the positive advantages and the enjoyment of personal liberty conferred by freedom from forcible restraint. But with the increased interdependence of modern life, and the enlarged potentialities of individual misconduct, the stage was likely to be reached when the losses and injuries inflicted on society at large and innocent individuals outweighed the values of extra-legal freedom. When that point was reached it was time to put the control of the use of alcoholic liquors into the hands of the law. Whether that point had actually been reached in the United States in 1919 is another question upon which opinions differ and which need not be discussed here. Doubtless the War was a precipitating factor, and in this matter, as in all others, belief is a weighty consideration.

So, it might be that crime increases not because men are getting worse but because society is getting better.

Unfortunately, the facts give only partial support for this optimistic interpretation. For the increase is decidedly marked in the basic crimes of murder and theft. There is no escaping the fact that in its efforts to deal with its members by force and the fear of force society has not proved nearly so successful as in the

more persuasive methods. This may be because force and the fear of force are expedients not well adapted to the qualities of the human atom, or it may be because the small minority of the population for which the criminal law exists are a particularly difficult class to deal with, as of course they are. If they were not, they would not need the law. We are accustomed to think of the law as a great restraining wall, hedging us in on every side. For almost all of us, however, almost all of the time the law is no restraint at all. Most of the things that the criminal law forbids us to do we do not want to do anyway—they do not interest us—and most of the rest of them we are adequately restrained from doing by public sentiment and opinion, by familial love, by religion, or by some other of the persuasive agencies. If we are not, we usually do them anyway, in spite of the law. It is doubtful if more than a small fraction of the readers of this book were ever restrained from doing a criminal act just because there was a law against it. One reason why the Volstead Act stirs up such a fuss is that it affects a lot of people who are not used to obeying the law against their interests. The law exists because of the minority, and the expense, inconvenience, and irritation that it imposes on the rest of us furnish just one of many illustrations that in the most democratic of societies we are ruled largely by the minority rather than the majority. This genuinely criminal minority, though not physically atavistic, as Lombroso claimed, is to a great extent socially atavistic. That is, their balance between egoism and altruism is that appropriate to an earlier stage of

social evolution. They do not respond to the stimuli effective with the normal members of society. Society has not yet learned how to tap those springs of conduct in their natures that will bring normal response. Hopeful signs on the horizon are the vastly increased interest in the subject, and the tendency to apply truly scientific methods to its study. Constructive results may not be so far in the future as some appearances indicate.

War

The force with which society has entrusted the state is designed to be used not only for purposes of control within the society, but for the securing of benefits in relation with other societies. The state not only has the police power, but the war power also. The two chief ends for which the war power is employed are protection and aggression. History seems to teach that societies have not been much more successful in the application of force externally than internally. The positive gains of warfare, at least under modern conditions, are, as Norman Angell has so convincingly demonstrated in "The Great Illusion," and the World War so effectively illustrated, practically non-existent. So sure of this are many people today that there is a vigorous movement to banish the inter-societal use of force entirely from the recognized resources of social engineering.

CHAPTER IX

SOCIAL ENGINEERING

THE suppression and restraint of misconduct is one branch of personal reform. The elimination of incompetency in both its forms is another. This is a vast subject, involving the fields of medicine, psychiatry, social case work, education, and a host of other remedial agencies. Here, perhaps, more than anywhere else, social engineering has scored its successes in recent decades. We have grown very hopeful over this type of reform, and so eminent are its achievements that we are again in danger of making it a fetish and overestimating its possibilities.

Inadequacy of Personal Methods

There are some forms of abnormality which, while appearing in the individual are really located in society itself and so can not be eradicated by personal methods. A characteristic example of this is the evil known as unemployment. This appears always in individuals, and it has been quite customary to attribute it almost invariably to the deficiences of the individual himself; he is lazy, or shiftless, or untrained, and so the remedies proposed have been personal, education, moral suasion, threats, vocational training, etc. A keener insight has revealed that the great bulk of unemployment is trace-

able to social causes. There is an actual deficiency of positions relative to the number of workers. In such a case, remedies that are useful from the personal point of view produce no results whatever from the social point of view. It seems quite logical, when an unemployed worker is evidently below the average of proficiency in his trade, to urge him to improve his qualifications in the assurance that this will bring him a job. It may very well be that after his training is finished he will get a job. But if there is a social deficiency of employment it will simply mean that some other worker will lose his job. It is like giving a concert that will attract 1200 in a hall that will seat only 1000. The thing for you and me to do, of course, is to go early. But that is no remedy. 200 will have to stand in any case, and the more people who attempt to use that solution, the greater will be the total amount of inconvenience and time lost. The only thing to do is to hire a hall big enough. There are many forms of maladjustment where personal remedies are not even palliatives. They produce no alleviation whatever. These are cases where the institutions and forms of society itself are out of adjustment with the normal for that society. The correction of such abnormalities is true social reform.

Unscientific Expectation

In some cases these abnormalities are a part of the expectation of society itself. For societies do not always know what is good for them, and insist upon the perpetuation of forms that are injurious. The old-fashioned American saloon was not ideal, but it certainly was average. Few com-

munities, however small, lacked one at least. It was recognized and taken into account in many phases of contemporary life. It was not normal, however, as everybody now agrees. It did not conduce to the efficient functioning of our social mechanism. Accordingly, the Prohibition movement, whether wisely conceived or not, was unquestionably a valiant endeavor toward social reform. There are a number of such abnormalities in every society. Unemployment, industrial depressions and crises, seasonal industries, epidemic diseases, an unstable currency, the maladjustment between the family mores and the economic mores,[31] the lack of non-commercial recreational facilities, the superfluity of religious institutions in small communities —these are only a few of the abnormalities that promise no relief save through well-organized, scientific, social effort. The individual is powerless. And, as already suggested, it appears more and more certain that no agency at the command of society is adequate for these tasks save the state. Let it be granted as freely as possible that the state, even in its constructive, regulative, and benevolent aspects is the agency of last resort. When all else fails, the state is there to use. And the evidence is that the state will need to be used more and more extensively as long as social evolution proceeds in the present general direction. Conflicting interests extend over ever-widening circles. Personal contact becomes less and less a factor in the mechanism of harmonization. Only the state can take its place.

Furthermore, it appears that larger and larger units of state organization will have to be enlisted. The area

of control must correspond with the area of competition. Business, industry, religion, politics, are now organized on a national scale. Only a national government is extensive enough to cope with the situations that result. For this country, this means a progressive enlargement of the functions of the Federal government. This tendency is deplored and resented by many persons who see in it a dangerous departure from established traditions. But extension is the spirit of the times, and it is impossible to see how government can be kept from accommodating itself to it. Nothing could be more ironically humorous than to witness associations of manufacturers organized on a national scale officially protesting to Congress against the Federal control of child labor.

Extension of Area of Control

There is every reason to suppose that internationalism will come next.

The older and more firmly established relationships of expectation and conformity between society and the individual become standardized in the form of rights and duties. The society that makes so many demands upon its individual members, compensates them with certain grants. A right is any claim of an individual in which society will back him up. Like most social phenomena, rights are concerned with interests. The ways in which society will back up an individual with respect to a specified right are various. They fall into two main groups. The first includes the use of public sentiment and opinion. The second includes the law. Rights which are backed up by public sentiment and opinion, with or without the

Rights

law, are moral rights. Rights that are supported by the law, with or without public sentiment and opinion, are legal rights. It is easier to get a definite statement of legal rights than of moral, but many persons regard the latter as more important. Oftentimes a moral right and a legal right come into conflict. In such case the interested party often prefers to rely on the moral right rather than the legal. Judge Lindsey on trial for refusing to divulge a confidential conversation, and William Sanger charged with the violation of the law against circulating obscene literature, cared more for the support of public feeling than for the vindication of the court. A right that is extended to some members of the community but not to all is a "privilege."

There has been a vast amount of confusion about the nature of rights. There was a time when the doctrine of natural, or God-given rights was very popular. It was also very useful, and served a valuable purpose in breaking down privilege and emancipating the common people. This is another excellent illustration of the principle that men's opinions about a thing are often more important than the truth, for this doctrine is now generally conceded to be entirely false and fallacious. The liberal movement of the closing eighteenth century would have been seriously handicapped if social leaders had known as much about the nature of rights as we do now. Today we realize that all true rights, all rights that have any actual existence, are given by society, not by either God or Nature. What are referred to as natural or divine rights are nothing more than what

somebody believes Nature or God would give if they gave any rights at all. But nature does not enforce any rights—Nature contents herself with imposing conditions. Neither does God enforce rights save, possibly, through society, in which case there is no possibility of proving whether they are divine rights or not. But when a sufficient number of people unite in believing that nature or God *would* enforce a certain right, they are able to impose their belief upon society, and then it becomes an actual right. But every right is conditioned, and the conditions are set by society. Even the right to life itself is conditional upon certain behavior, as is evidenced by the fact that society does not hesitate to take life if the conditions are violated. Even though capital punishment be eventually abolished, it will not mean that society has abandoned its authority, but merely that it has concluded not to assert it.

Liberties

The same thing is true of liberties. Liberties are granted by society and are enjoyed within society. They too are conditional, and the conditions must of necessity vary with the form of society. This is another truth difficult for the conservatively minded to grasp. Their mental equipment includes notions of liberty based upon outworn conditions. They have difficulty in realizing that changes in the form of society inevitably involve changes in the forms of liberty. With the increasing dominance of society, the whole concept of liberty tends to become much more social than individual. The outstanding liberty of the modern individual is the liberty to determine, or help

determine, what kind of a society he shall live in rather than the liberty to live as he pleases in any kind of a society.

The chief reason for this situation is that the increased complexity of society has vastly increased the interdependence of individuals upon each other and upon society. Individual behavior has immensely wider and deeper implications than ever before. Instances of abnormality that in the Middle Ages would have affected only two or three now may affect thousands. In spite of the impersonality of actual relationships, the individual has acquired an unprecedented significance. Society can not take chances on the failure of anybody to do his part. A moment's lapse of attention on the part of a train despatcher may cost a hundred lives. A single typhoid carrier may infect a whole community. The individual must submit to ever increasing restraint. It is not difficult to understand how bitterly some individuals resent this development. But there seems to be nothing for them to do about it but to transport themselves to some more primitive society where life is more simply organized. You can not enjoy elaborate social benefits and pristine personal liberties in the same society.

Relativity of Social Truth

It is a hard lesson to accept that in faulty, maladjusted human societies error, in the abstract sense, may occasionally produce better results than abstract or absolute truth. This is simply a corollary of the principle of normality, and another way of saying that, in social affairs at least,

truth itself is relative. History is full of instances where philosophic beliefs that later epochs have discarded as intrinsically false, have produced highly desirable social results in their own day. The doctrine of *laissez faire* may be cited as a single additional instance. But error can not be relied upon as a safe guide. Societies, in their blundering way, have managed to get along fairly well so far with the tentative, rule-of-thumb methods of social art. But these are no longer accepted as good enough. Men of the present demand that their social guides be furnished by science, and science must have access to the truth. It is not safe to muddle along in the hope that one blunder will offset another.

Social Reform

The central task of social reform, then, is to seek out the cases of social abnormality, grasp their nature and their relation to other aspects of the social organization, and devise remedies for them which will harmonize with the general normality and so not do more harm than good or require a complete recasting of social relations. We must learn the nature of unemployment, and get at its causes; we must understand how industrial depressions arise and devise means of preventing them without upsetting the economic system; we must find out what causes slums, and learn how to eradicate them without leaving thousands of families homeless; we must discover some basis of adjustment whereby women may be given their full rights as individuals in occupations and elsewhere without destroying the essential functions of the family.

Surely a sufficiently challenging program to enlist the interest of the most scientifically ambitious minds of a scientific age!

But there is an even greater task. This is concerned with the problem of improving normality itself. As has already been emphasized normality is in no sense perfection. Societies have always worked, but they have never been ideal. The ideal is always far ahead, and, like every true ideal, is probably unattainable. But it is something to work for. The task of consciously, deliberately, purposefully working toward a social ideal is the task of "social progress" in the true sense of the word. Movement in the direction of the ideal *is* social progress. An interesting parallel is furnished by the development of the automobile. Automobiles have always worked ever since there was anything that could properly be called an automobile. The first Ford ever made could travel, but it is an extraordinary looking vehicle by the side of of a modern seventy-five horse-power sedan. Each motor car, of each respective make, as it has been turned out of the factory has been a normal piece of mechanism, consistent and properly articulated within itself. But each successive model has constituted (presumably) an improvement, and over a period of three decades there have been sweeping advances. This has resulted because the automotive engineers knew what they were about. One central feature of this knowledge was the consciousness of what they wanted. Before better cars are built somebody must know how to build them. But in order to know how to build them

Social Progress

somebody must know what better cars are. There must be definite standards as to what constitutes a good motor car. The automobile designers have such standards. They know what they want, and their achievements rest solidly upon that knowledge. Some of the things they aim at are speed, power, safety, "roadability," comfort, beauty, economy, low cost and low upkeep.

In like manner, social engineers, if they are to produce results, must know what they want. They must have definite standards as to what constitutes a good society. They must have an ideal.

Idealization

"Ideal" is a much abused and misconstrued word. There are very false ideas prevalent about the nature of an ideal. It is popularly regarded as something visionary, unpractical, illusive, and quite beneath the notice of a scientifically minded person. Nothing could be more erroneous. An ideal is simply somebody's conception of something better than that which exists. Every great achievement in art, architecture, or engineering was an ideal before it was a reality. The Brooklyn Bridge was an ideal before it was a bridge. The Hermes of Praxiteles was an ideal before it became an immortal work of art. The 110-story office building referred to on an earlier page is at present an ideal. Two years from now it may be a reality. Leonardo da Vinci, one of the most practical men of his time, was one of the greatest idealists of all time. The process of idealization is the characteristic activity of all inventors and creators in every department of

achievement. Whether an ideal is vain and negligible depends on what it rests upon. If it rests upon a definite conception of what constitutes quality or merit in the given field, upon a knowledge of the materials to be worked with, and upon a full grasp of the practical possibilities, it is quite the reverse of visionary and contemptible. There is an element of imagination in all ideals. Only those are illusory that rest upon imagination alone, with no solid foundation of knowledge.

Idealization with reference to social affairs has always been a favorite exercise of certain philosophic minds. The creation of Utopias has attracted many resourceful and vigorous intellects.[82] In very few such cases, however, has there been any sound basis of knowledge of social realities, and so the results have been fantastic and bizarre. However attractive some of these ideal communities may appear, there has been little chance of their realization. Practical idealization waits upon social science. The first prerequisite is a tangible conception of what constitutes a good society. What is society for?

Social Goals

To this question there may be a variety of answers, and the following are meant to be only suggestive. Society exists not for itself, but for the individual; it is a means to an end. The end is the good life. What is the good life for the human individual? Prosperity? Well-being? Wealth? Comfort? Happiness? Service?—but what is service but a means to happiness? This, you may say, is a philosophic question. Granted. But it is the central question in all practical social science, and upon its

answer must depend the direction of all intelligent and deliberate social activities. Different answers have dominated different historical epochs. "The difference between historical periods, as the late T. E. Hulme pointed out, is a difference between the categories of their thought." [33] The difference between random social movement and social progress depends upon a clear conception of the objective of social effort.

A first essential in scientific social idealization, as has already been made clear, is a knowledge of the materials. The study of social science begins with man. To say that this takes us into the fields of biology and psychology is to dodge the issue. No matter by what name it is called, a knowledge of the nature of individual man is just as necessary for the social scientist as a knowledge of the nature of the atoms, and of various kinds of atoms, is for the physicist or the chemist. And in the background of it all is the mundane setting, a knowledge of the earth itself.

Individual Influence

If our interpretation is correct, it should help to dispose of the perennial controversy over the rôle of the individual in social movements, and the place of the Great Man in history. If social movements arise from social forces, and if social forces inhere in the individual, then no social force is unimportant, and no individual is negligible. Any given social movement must be the result of the composite of the social forces existing at the time. As in the material world, so probably in the social world, no force is ever lost. Every individual, however humble, makes his impression on the social realities of his day, and the

social world is never the same as it would have been if he had not lived. How much impression he makes depends upon the nature and the "potential" of the forces that are embodied in him. On this point individuals doubtless differ between very wide extremes. Some are of infinitesimal significance, others are veritable dynamos. The impact that any individual makes upon the social body of his time depends primarily on the quality and volume of his own forces. Secondarily, of course, it depends upon all sorts of conditions. There are crises in social affairs when a peculiar set of forces embodied in a single person produce results that could not have been produced in any other way. It seems the height of scientific absurdity to assert that the history of the nineteenth century would have been the same if there had been no Napoleon or that the present state of international relations would have been the same without a Woodrow Wilson. The map of Europe today might have been very different if Wilhelm Hohenzollern had started life with two good arms. On the other hand, it is equally absurd to assume that any one personality, however dominant, embodies the whole of the social forces of the moment. There are many times when the prevailing social force represents the consensus of innumerable minute impulses that in the aggregate suffice to sweep all before them. The apparent great man at such a time may be merely a puppet, a figurehead, or a symbol.

The materials, then, with which the social engineer has to deal are people, men, women, and children. Two great features of this material concern the engineers of

any given society—how many people have they to deal with and what kind of people have they to deal with. And from the point of view of idealization the question becomes: how many and what kind of people would they like to deal with? It is highly significant that of all permanent or recurrent social problems these are practically the last to receive recognition even in the most advanced societies.

It was a century and a quarter ago that the question of population emerged, at the hands of Malthus, as a definite social problem, and it remained for Galton, in spite of brilliant intuitions of earlier thinkers, to establish eugenics as a definite social problem.

Constants and Variables

Walter Lippmann, in his highly stimulating book "The Phantom Public" discusses the nature of a problem. He arrives at the conclusion that problems arise from the combination of several variables changing at differential rates and hence needing constant readjustment. "In an absolutely static society there would be no problems. A problem is the result of change. But not of the change in any self-contained element. Change would be unnoticeable unless we could measure it against some other element which did not change at the same pace. . . . The change which constitutes a problem is an altered relationship between two dependent variables." [34]

There is doubtless a great amount of truth in this interpretation. But there is an even more significant consideration. A problem may arise out of the relation between a constant and a dependent variable. Many of the gravest problems of social life, in point

of fact, arise from two great sets of variables working against two fundamental constants. The two variables are human individuals and human society, both of which, as has been so repeatedly emphasized, are highly dynamic. The two constants are the unalterable elemental qualities of the earth, and the unalterable genes in the human germ plasm.

Population

The problem of population is essentially a problem of what evolving societies can possibly do, and what they can profitably do, in respect to the capacity and tendency of the human species to multiply indefinitely upon an earth with positively limited material supplies. We have seen what the outcome of this situation is with all the infra-human species—inevitable submission to the law of stationary population. We have also seen that man has hitherto escaped that law by recourse to the great expedients of movement and economic culture which have interacted and complemented each other throughout the whole course of social evolution. The former of these, obviously, has its positive limits. There is only so much standing room on the earth's surface. This has already been very completely appropriated, and while much may still be possible in the future by way of redistributions and readjustments of population, there is little probability that any notable resources can be opened up in the future in this way. The expedient of movement has virtually come to an end. The future increments of human population must depend almost entirely upon advances in economic technique.

What the possibilities are on this basis no one would

wish to say. Human ingenuity has already demonstrated such resources that it would be the height of folly to attempt to fix bounds to it in the future. It is helpful, however, to keep firmly in mind the nature of these achievements. The increase in human population has been largely at the expense of other populations. Man has directed the resources of the world more and more completely to his own support. He has substituted human life for other forms of life. He has made the resources of the world more available, but he has not added one iota to the inherent resources themselves. To such a process there must be inexorable limits. One thing is absolutely certain. Mankind can not continue increasing indefinitely at the present rate. If the rate of increase that prevailed over the world at large during the years 1906 to 1911 were to continue at the end of 10,000 years the population of the globe would be 221,840,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000,000. Allowing 1½ square feet of standing room for each person, this population would require 60,570,000,000,000,000,000,000,000,000,000,000,000 times the entire standing room on the earth's surface. If 10,000 years seems too long a period to particularly concern you—somewhat too remote from your interests—we can consider that if the United States were to continue to increase its population at the rate that prevailed during 1906 to 1911, by the end of this century—a date that some of the readers of this book will live to see—this country would be considerably worse crowded than China is at present, and soon after the middle of the next century it

would contain more people than there are in the entire world today.

Long before this time, something must happen. It is the task of social scientists to point out what may happen, and of social engineers to decide what ought to happen and to devise means for bringing it about. One thing that has already been discovered is that long before the maximum possible increase had come, there would inevitably have occurred a serious decline in the average supplies of material goods per individual—what is called the "standard of living." This would result from the operation of what economists have named the "law of diminishing returns." As the number of people in a society occupying a given area of the earth's surface increases there inevitably comes a time when additional expenditures of capital and labor, while they may produce an increase in the aggregate amount of goods, do not produce an increase in the *per capita* amount of goods. Consequently there is a decline in the standard of living. But in terms of population this means that as population increases on a given piece of land, the standard of living can be maintained only by a corresponding improvement in the arts of production. If economic culture lags behind population, the standard of living must suffer. Hitherto, taking the world as a whole, advances in economic technique have been sufficient not only to maintain the standard of living, but vastly to improve it. But these advances have been made in conjunction with movement, that is with the continual acquisition of new land. The population question of the future is whether improvements in the in-

dustrial arts can be rapid enough to keep ahead of population and maintain the standard of living *without new land.* There seems little ground for hoping that this is possbile. If not, the time seems not far distant, even in the United States, when society will have to decide between population and the standard of living, and gains made possible by improved methods of production will have to be applied either to the standard of living or else to the population. Both will no longer be able to advance together. In preparation for this situation, it is clearly essential that standards of social desirability be adopted, so that we may know which of these interests we wish to promote.

The attitude of social science is that the whole question of population should be brought into the realm of knowledge, reason, foresight, deliberation, and choice as completely as possible. At the present time it is largely dominated by belief. It will probably never be possible, or even desirable, to eliminate the element of belief from it entirely. But it is certainly far too important a matter to be denied the full benefit of the scientific method.

Eugenics

What determines the kind of people? Two things, Heredity and Environment, as any school-boy can tell you. Heredity furnishes the constant in the form of genes in the germ plasm. According to the hypothesis which it seems best to follow in the present state of genetic knowledge, the sorts of genes were fixed permanently long ago, just when no one has told us. Different sorts became fixed in different races. The numbers are not fixed but are

capable of indefinite expansion. These genes furnish the material upon which the environment works. The physical environment, we believe, can not change the genes themselves in any way. It may, however, affect the bodies that grow out of the genes in two ways. It may select certain genes for perpetuation by the requirements it imposes for the bodies that are to survive in it. Genes that do not produce bodily traits adapted to the environment have a poor chance of being carried in a body long enough to be passed on to the next generation and so tend, in the course of time, to disappear. Thus the environment can eliminate genes, though it can not change them. The genes that the environment selects tend to become what we call the fixed and permanent heredity of the species, though it is permanent only so long as the environment remains constant. Thus the environment produces the type, but it can produce only such types as are made possible by the germ plasm that is given it to work on. This is why there are always unoccupied niches in nature.

Environmental Physical Influence

The second way in which the physical environment may affect the bodies that grow out of the genes, is by influencing the form that any given unit character may take, that is, the *way* in which a gene works itself out in the body plasm. This is what we usually have in mind when we speak of environmental influence, and its reality is a commonplace of everyday observation. We know that the same acorn planted in an open fertile valley, in the midst of a forest, or on the top of a bleak, windswept hill, will develop into very different kinds of trees. We know that the same man who is pale and sallow while

he spends his days in a stuffy, poorly lighted office grows tanned and ruddy after a few months in the open. The basis of the controversy that perpetually revolves around these two factors, heredity and environment, is not the existence of one or the other, but their relative influence in determining actual characteristics.

Of all popular discussions this is perhaps the most futile, and it is a pity that all the time and energy devoted to it could not be turned to some more useful purpose. For the obvious answer is that both are immeasurably important. Both are indispensable. It is almost exactly equivalent to asking which is more important, the soil or the seed. The environment is just as essential to the development of any hereditary trait into body plasm, as the soil is for the development of any seed into a plant. No hereditary trait can develop except in its appropriate environment, and the way it develops will depend precisely on the nature of the environment. Of course, no amount of environmental influence can turn a Negro into an Eskimo any more than it can make a thistle grow from an acorn. But if the environment is not right there will be neither Eskimo nor thistle. Recalling that everything that happens to an organism after conception is attributable to environment, we have no difficulty in appreciating that whatever the organism is at any time thereafter is largely the product of environment.

The human environment works in a way similar to the physical, but significantly modified. It too, selects the genes that produce bodily traits suited to itself. In this process, the competition of life plays the same rôle that the struggle for existence does in natural selection. Wher-

Human

ever human competition is on such terms that success or failure becomes a matter of life or death, there the human environment selects the traits to be perpetuated. This was clearly the case during the days of savagery when life was dependent upon success in the rivalry for food or in the issue of hand-to-hand combat, and procreation, possibly, depended on a forcible struggle for mates. Fully as many human traits of keenness, courage, determination, perseverance, shrewdness, guile, may have been set in the plastic material of early man by the influence of the human environment as by the physical.

The progress of civilization, however, with its increased valuation on human life and respect for human personality, and its progressive relaxation of the terms of the competition of life, has altered this situation. Life and the opportunity to procreate are today much less dependent on success in rivalry with others. On the contrary, the attitude of modern societies is to attempt to preserve the life of everybody, even of the competitively unfit. And very few of those who are kept alive are prevented from procreating by any selective influence in the human environment. The human environment, accordingly, has today very little effect on the hereditary qualities of its members.

Social Adaptation

But as the influence of the human environment on hereditary traits has declined, its influence upon the way those traits develop has magnified. The modern man is more a creature of his environment than ever before, and the predominant environment is the human. Much of this book is a

study of the way in which the human environment moulds the individual. All human affairs, indeed, tend to become transferred to the societal plane. Even the physical environment tends now to select and perpetuate social traits rather than individual, and the competition of life is now, in its exterminative aspects, more between societies than between individuals. That is to say, survival of the fittest, in anything like a Darwinian sense, is at present exhibited between societies, or between social forms within a society. In other words, *human nature* is now selecting the types of society that are adapted to it and therefore may be permitted to survive. So the relation between "adaptor" and "adaptee" is reversed in the social realm as it has already been reversed in the physical realm. And in the same way a reversal that was at first haphazard and empirical is now becoming deliberate and scientific.

Modern Killing

The two forms of killing that we have seen to be characteristic of life on this earth, the active and the passive (see pages 19–20), find their counterparts in human society. Men kill each other by their persistent, self-centered struggle for the supplies of nature. The lower the stage of civilization the more direct and obvious is this form of slaughter. Starvation and exposure are the obvious agencies. On higher levels of culture the results of this struggle, which we call economic competition, are masked and obscured. The causative action of competition is seldom conspicuous or even observable. People seem to die from disease, or old age, or suicide. The operation of competition is disguised by the complexity

of the modern social organization. In point of fact, as we have seen, modern societies as far as possible interpose to prevent people from actually dying from any cause whatsoever. The toll falls largely upon infants, including the unborn.

The active form of killing displays itself primarily in war, and to a minor extent in more individual forms of slaughter. One of the great remaining tasks in man's struggle for emancipation from the laws of nature is the discovery of substitutes for war.

The eugenics movement rests on the conviction that the deliberate influence of the human environment should not be restricted to moulding the character of the individual after it has been fixed in the embryo, taking that as it comes, but should be extended to include the determination of what the embryo itself shall be. It contemplates, in short, the controlled breeding of human beings.

Artificial Selection

Now every process of artificial breeding requires first of all a breeding program, which is essentially a matter of idealization. The breeder must select in advance the traits that he proposes to develop. He must visualize the type he desires to create. So the eugenics program requires that society shall decide what type of human beings it proposes to develop. This is undeniably a task of almost infinite difficulty. Among other questions involved is the fundamental one whether it is preferable to breed a general all round type, excellent in both mind and body, or to breed one strain for physical excellence and another for intellectual superiority, or whether, per-

haps, to carry specialization even further and breed for detailed qualities, one stock being destined for mathematicians, another for musicians, another for bankers, and others for railway engineers, bootblacks and garbage collectors. This may seem like a *reductio ad absurdum,* but the underlying principle is serious and vital.

Along with a breeding program, artificial breeding requires control of the breeding organisms by the supervising breeder. Here is perhaps the greatest obstacle of all in the way of eugenics. For the breeder and the bred are one and the same. The breeder is society, the organisms bred are the individuals in society. Eugenics, in short, requires control by the controlled. Various solutions of this dilemma have been proposed which we can not stop to review here.

The possibilities of eugenics, as in every other environmental influence, depend upon the materials it has to work with. Eugenics has to take human genes as they exist. It can neither change them nor make new ones. Any modifications that eugenics can produce, therefore, must be accomplished in two ways. It can arrange new combinations of genes, or it can destroy genes. Whenever a human being dies without progeny, the genes in his particular colony of germ cells are removed from the stream of heredity for ever. Society can manage this result if it sees fit by death, segregation, or sterilization. Society can pick out all individuals who give bodily evidences of having undesirable genes in their germ plasm, and see to it that those particular genes cease to be perpetuated. In a very few generations striking results could be—in fact

already have been—produced. Measures of this type come under the head of "negative eugenics."

"Positive eugenics" aims at the creation of new types of human beings, on an idealized basis. The only possibility of doing this, as far as present knowledge goes, is through selected combinations of existing germ plasm. This is an extremely complicated task, for desirable genes can not be isolated from the germ plasm, but the germ cells must operate as a whole. So combinations that promise good results with respect to certain genes might be very undesirable in regard to others. At the present time, the practical precepts of scientific eugenists as to positively desirable matings go little beyond the counsels of practical common sense. But the future lies before us, and eugenics is in its infancy.

Multitudinous Problems

These are the two fundamental problems of true social progress. But there is a host of others, scarcely second to them. Some of these illustrate clearly the origin of a problem in "an altered relationship between two dependent variables." The two most important dependent variables in social affairs, as has been said, are the individual and society. Between these two there appears to be an inevitable variation in the rate of change. On the whole, society tends to be much more dynamic than the individual. Social change tends to proceed much more rapidly than individual change. But since society is dependent upon the individuals that compose it it can never outstrip the change in human nature beyond a certain margin. Thus the nature of the individual continually acts as a drag upon social change, and a state of stress and tension

is set up. Many vital social problems find their ultimate explanation in this situation. Thus, for example, social change in the past generation has demanded the equalization of rights and opportunities between men and women. But the nature of the individual, as a biological unit, still imposes a wholly different burden upon men and women in the perpetuation of the species. The task of reproduction, for the man, is transitory, pleasurable, and without immediate consequences. For the woman it is enduring, burdensome, painful, and often dangerous. It involves her in immediate relationships with another individual which extend over months or years. Thus the inert and resistant biological qualities of the individual continuously put the brake upon the surge of social change. The vagaries of feminism are only some of the more conspicuous evidences of the resulting strain.

Differential Change

Different social institutions also display differential rates of change among themselves. On the whole, economic institutions tend to change more rapidly than familial institutions. The maladjustment between the economic mores and the family mores to which reference has already been made (see page 252), is one of the resultant problems. Religious institutions, as a rule, change very slowly.

Various other problems urgently demand attention. The whole system of distributing the products of industry clamors for overhauling, the traditional institutions of democracy show signs of collapsing under modern conditions, a news basis of international relations is imperatively needed, the family has lost so many of its

ancient functions that it threatens to cease functioning at all. All these problems, and a thousand more, are eminently suited to the scientific method, and only by that method can they be intelligently and constructively handled. The attainment of the scientific attitude of mind toward social affairs on the part of every member of society is the crying need of the age. Every social fact must be given its full value, regardless of its bearing on personal interests, or its affect upon cherished theories. Classification must be orderly and rigid. Interpretations must be penetrating and impartial, and every established conclusion must be fearlessly accepted. No social form or institution must be regarded as too sacred to be submitted to critical examination and analysis, not monogamy, nor monotheism, nor the Constitution of the United States. No doctrine can be regarded as too new or novel to be given a chance to justify itself, not feminism, nor free love, nor communism. All things, old and new must be put on their merits, and judged against the background of the total accumulation of sociological fact and law.

Such an attitude of mind will long remain impossible for the mass of mankind. But it should not be impossible for a number of leaders sufficient to guide us onward to a mastery of the human environment comparable to that already established over the material environment. The ultimate basis of success in all deliberate social engineering lies in the general uniformity of the social atoms with respect to essential qualities. It is this that makes possible the establishment of any wide, not to say universal,

Future Possibilities

principles of social wisdom and constructive idealization. On the other hand, the variations necessary for progressive societal evolution must be supplied by exceptional individuals, or exceptional qualities in individuals. The conformity that society requires for its smooth functioning is conformity only in conduct. Freedom and individuality of thought, feeling, and imagination, even though these tend eventually to non-conformist action, are indispensable to progress, and are innocuous provided they are coupled with intelligence, knowledge, and social responsibility.

On the basis of these general principles, as fast as they are established, it will be possible for social engineers to set up comparisons of various social forms and institutions, not dependent upon any traditional and irrational group feeling—racial, religious, national, or economic—but reflecting a factual evaluation of each item in the light of its predictable consequences, which, in turn, must be projected against the background of whatever final goals the society in question may be aiming at. So will social effort become scientific, purposeful, and valid, so will beliefs become sound and dependable, and man's mastery of his social environment be achieved.

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